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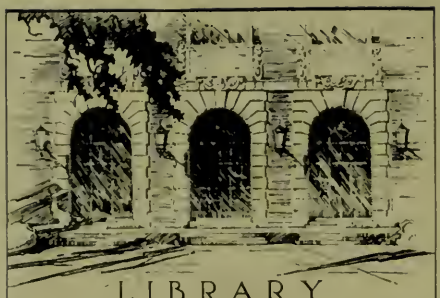

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THE

ANNUAL JOURNAL

OF THE

ILLINOIS STATE DENTAL SOCIETY.

TWENTY-FIRST ANNUAL MEETING,

HELD AT

PEORIA, ILL.,

MAY, 1885.

"ARTEM DOCTRINA SANITATEM ARTE."

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1885.

PRESS OF
PATTERSON & WHITE,
PHILADELPHIA.

1885

The Illinois State Dental Society.

Organized July 24, 1865.

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Wm. E. Quine

MINUTES OF TRANSACTIONS

OF THE

ILLINOIS STATE DENTAL SOCIETY.

TWENTY-FIRST ANNUAL MEETING.

BY J. W. WASSALL, SECRETARY.

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FIRST DAY.—MORNING SESSION.

THE first session of the twenty-first annual meeting of the Illinois State Dental Society, held in the Masonic Building, Peoria, was called to order Tuesday, May 12th, at 10.15 o'clock A. M., by the President, Dr. H. H. Townsend of Pontiac in the chair.

Prayer was offered by Dr. Edmund Noyes of Chicago.

Dr. Geo. A. Wilson of Peoria was introduced and addressed the society as follows:

MR. PRESIDENT AND GENTLEMEN: It has been suggested that I say to this society a few words of welcome to our city. It strikes me very forcibly that the dental profession now occupies a position far advanced over that which it held a few years ago. To be a dentist *then* it seemed only necessary for a man to announce himself as such and display a turnkey—the very sight of which would frighten his victim nearly to death, and the twisting application of it might completely finish him. Your profession, I say, has made rapid strides since those days. Now you are scientifically educated physicians, understanding the anatomy and pathology of the human tissues. Your colleges, societies, State laws and boards of examiners have rapidly elevated the standard of your calling until it ranks as a distinct, learned and skilled profession.

You are to be congratulated on your achievements—as is also mankind to be congratulated on your progress; for are not *all* benefited by your coming together here for mutual improvement? In behalf of the citizens of Peoria, I extend a hearty welcome. We are glad to have you here and to find you so comfortably situated

The President said in response:

Dr. Wilson: Permit me on behalf of this society to thank you and the citizens of Peoria for your very kind and cordial welcome. We appreciate very highly the compliments paid our profession, and are proud to acknowledge the advance in dental science to which you allude.

It is fourteen years since this association met in Peoria, and it affords us pleasure to note the improvements in your city since our former visit,—the large increase in your population, the beautiful and substantial buildings, the stir of business on your streets, all indicating this to be one of the most thriving cities in the State. We selected this as a place of meeting partly on account of the attractions of your city and the excellent hotel accommodations, and partly to do honor to the members of this society who are located here. Allow me to congratulate you and the good people whom you represent upon your beautiful city, and upon the dental profession of Peoria, which is an honor not only to this society, but also to the profession of the State.

Roll-call showed the presence of forty-seven active members at the opening of the meeting.

The list of active members is as follows; those whose names are in *italics* were present at some time during the meeting, and those marked with an asterisk (*) have sent dues to date:

Allen, E. H.	Freeport.
Allport, W. W.	242 Wabash Av., Chicago.
Ames, W. B.	34 Monroe St., Chicago.
Beckwith, T. W.	Sterling.
Black, G. V.	Jacksonville.
Blythe, J. M.	Decatur.
Brophy, Truman W.	125 State St., Chicago.
Brown, A. E.	1536 Wabash Av., Chicago.
Burress, A. E.	Walnut.
Call, E. B.	Peoria.
Campbell, J.	Bloomington.
Christianer, F.	Abingdon.
Christman, G. A.	95 Fifth Av., Chicago.
Clark, A. B.	68 Ogden Av., Chicago.
Collins, J. W.	Lincoln.
Cormany, J. W.	Mount Carroll.
Cresswell, J. J.	Galena.
Crouse, J. N.	2101 Michigan B'd, Chicago.
Cushing, Geo. H.	34 Monroe St., Chicago.
David, E. B.	Aledo.

Davis, J. A. W.	Galesburg.
Davis, K. B.	Springfield.
Dean, W. W.	Lacon.
Dorn, C. P.	Naperville.
Duncan, E.	Jacksonville.
Duncan, S. F.	Wilmington.
Dwight, C. R.	Danville.
Fishburn, J. M.	El Paso.
Fisher, J. W.	Bloomington.
Fitch, Henry H.	Pekin.
Freeman, A. W.	126 State St., Chicago.
Freeman, D. B.	325 Madison St., Chicago.
Gardiner, Frank H.	126 State St., Chicago.
* Gill, Henry C.	Rockford.
Gilmer, T. L.	Quincy.
Goebel, Robert	Lincoln.
Green, E. J.	Peoria.
Guffin, E. L.	125 State St., Chicago.
Hanaford, M. L.	Rockford.
Hand, M. F.	Joilet.
Harlan, A. W.	70 Dearborn St., Chicago.
Harrington, G. H.	Delavan.
Harrison, B. T.	Gibson City.
Haskell, L. P.	125 State St., Chicago.
Henry, Charles	Jacksonville.
Honsinger, E.	318 Park Av., Chicago.
Hurtt, J. M.	Mount Vernon.
Johnston, W. A.	Peoria.
Judd, Homer	Alton.
Kester, P. J.	628 Lake St., Chicago.
King, E. F.	Macomb.
Kitchen, C. A.	Rockford.
Koch, C. R. E.	3011 Indiana Av., Chicago.
Lane, Wm. J.	Decatur.
Lawrence, R. Neal	Lincoln.
Lionberger, J. M.	Dallas City.
McCoy, T. H.	Pana.
* McIntosh, F. H.	Bloomington.
Mace, R. H.	Belleville.
Magill, W. T.	Rock Island.
Marriner, J. Frank	Ottawa.
Marshall, John S.	242 Wabash Av., Chicago.
Martin, W. C.	Peoria.
Matteson, A. E.	3700 Cottage Grove Av., Chicago.
Matteson, C. F.	3501 Cottage Grove Av., Chicago.
Miles, Geo. S.	Jerseyville.
Moody, J. D.	Mendota.
Moody, Mrs. Kate C.	Mendota.

Murphy, J. D.	Bushnell.
Nelson, Nels	230 Milwaukee Av., Chicago.
Newkirk, Garrett	1536 Wabash Av., Chicago.
Noyes, Edmund	65 Randolph St., Chicago.
Ormsbee, W. W.	Geneva.
Ottofy, Louis	1228 Milwaukee Av., Chicago.
Patrick, J. J. R.	Belleville.
Patten, M. H.	Springfield.
Peck, J. W.	Canton.
Phillips, L. T.	Nashville.
Pollock, D. J.	Sterling.
Prichett, T. W.	Whitehall.
Priestman, Wm. H.	Pontiac.
Pruyn, C. P.	70 Dearborn St., Chicago.
Reid, Jas. G.	69 Dearborn St., Chicago.
Robbins, E. M.	Carthage.
Rohland, C. B.	Alton.
Salter, G. B.	Joliet.
Sawhill, F. H.	Clinton.
Schadle, A. C.	Warren.
Sitherwood, G. D.	Bloomington.
Smith, H. J.	Quincy.
Stephens, J. W.	Dixon.
Stevens, W. A.	121 Eighteenth St., Chicago.
Stone, E. C.	Galesburg.
Sturgiss, S. H.	Quincy.
Sunderland, D. E.	Freeport.
Swain, E. D.	65 Randolph St., Chicago.
Swasey, J. A.	3003 Michigan B'd, Chicago.
Taggart, W. H.	Freeport.
Talbot, E. S.	125 State St., Chicago.
Taylor, C. R.	Streator.
Thompson, J. F.	Central Music Hall, Chicago.
Tibbets, C. J.	Quincy.
Townsend, H. H.	Pontiac.
Waltz, A. S.	Decatur.
Wassall, J. W.	208 Dearborn Av., Chicago.
Wheeler, Thos. B.	3101 Michigan B'd, Chicago.
Widenham, J. C.	Jacksonville.
Wonderly, T. G.	Galena.
Woodward, W. B.	Peoria.

During the four days of the meeting the following-named new members were elected and qualified:

Bailey, R. W.	Macomb.
Davis, L. L.	524 Van Buren St., Chicago.
Dayan, L. F.	Hyde Park.

Emmert, J. W.	Freeport.
Freeman, I. A.	126 State St., Chicago.
Fulton, J. M.	Bloomington.
Gray, A. G.	Tonica.
Hawley, A. T.	Rock Island.
Herron, J. C.	Olney.
Kimball, R. H.	429 Orchard St., Chicago.
Olmsted, A. T.	Peru.
Smith, Gilman T.	Princeton.
Smith, W. B.	279 Warren Av., Chicago.
Salomon, Godfrey S.	15 Central Music Hall, Chicago.
Thayer, C. H.	21 Central Music Hall, Chicago.

Inaccuracies in these lists either of names or locations should be reported to the Secretary at once.

Dr. J. A. Bowman of St. Louis, Mo., and Dr. C. V. Baldwin of Los Angeles, Cal., were elected corresponding members of the society.

The following is a list of the Honorary and Corresponding Members so far as is known to the Secretary:

[Those whose names are *italicized* were present at the meeting.]

G. W. Keely, Oxford, Ohio.
W. H. Eames, St. Louis.
Edgar Parks, San Francisco.
*Isaiah Forbes, St. Louis.
H. J. McKellops, St. Louis.
R. J. Poore, Cincinnati.
H. S. Chase, St. Louis.
W. C. Barrett, Buffalo.
F. A. Brewer, San Francisco.
W. N. Morrison, St. Louis.
W. O. Kulp, Davenport, Ia.
I. P. Wilson, Burlington, Ia.
C. C. Chittenden, Madison, Wis.
R. S. Rathbun, Clinton, Ia.
L. C. Ingersoll, Keokuk, Ia.
J. Taft, Cincinnati.
C. R. Butler, Cleveland, O.
C. S. Smith, Lancaster, Wis.
J. Hardtner, Springfield, Ill.
C. W. Spalding, St. Louis.
A. H. Fuller, St. Louis.
Geo. A. Bronson, St. Louis.
J. G. Templeton, Pittsburg, Pa.
Gale French, Pittsburg, Pa.
Jno. B. Morrison, Indianapolis, Ind.
Geo. Watt, Xenia, Ohio.
Thos. W. Reed, Macon, Mo.
J. W. Reed, Mexico, Mo.
F. W. Dean, Des Moines, Ia.
C. W. Stutenroth, Watertown, D. T.
C. V. Baldwin, Los Angeles, Cal.
J. A. Bowman, St. Louis.

Dr. Pollock, chairman of the Executive Committee, reported, offering the printed program previously distributed as the order of business for the meeting. On motion of Dr. Brophy, it was adopted as official.

The Committee on Publication presented the following report, which was referred to the Executive Committee for auditing, who subsequently reported it back with their approval:

* Deceased since the meeting.

PEORIA, ILL., May 12, 1885.

Mr. President and Members of the Illinois State Dental Society:

Your Committee on Publication have caused to be printed and distributed [except a few copies which are still on hand] 450 copies of the Transactions of the twentieth annual meeting.

The financial statement is as follows:

CR.

By cash paid for printing and binding Transactions as per bill of Messrs. Skeen & Stuart	$260.50
By cash paid for engraving and electrotypes as per bill of Messrs. Baker & Co	148.00
By cash paid for postage, expressage, stationery, and incidentals	45.00
	$453.50

DR.

To cash received from sale of Transactions	$3.00
" " " " " Dr. Black's Charts	1.75
" " " for advertisements in Transactions	110.00
" " " from Treasurer	338.75
	$453.50

Respectfully submitted,

J. W. WASSALL,
P. J. KESTER,
Com. on Publication.

The Secretary presented the following report, which was referred to the Executive Committee, who subsequently reported it back approved:

Mr. President and Members of the Illinois State Dental Society:

Your Secretary offers the following annual report:

At the time of the last annual report the number of active members was 117; the number of new members received in 1884 was 8; making a total of 125. There are now lost:

By death 2

Dr. S. H. Verbeck of Lena, | Dr. D. B. Baker of Quincy.

By removal from the State 9

Dr. Geo. O. Howard, | Dr. J. H. Hyde,
Dr. Geo. T. Carpenter, | Dr. W. Xavier Sudduth,
Dr. Geo. W. Waltz, | Dr. Wilhelm Fraenkel,
Dr. C. V. Baldwin, | Dr. E. Pitwood,
Dr. J. M. Downing.

By non-payment of dues..... 3
Dr. Geo. M. Cameron of Carrollton, | Dr. J. R. Phelps of Chicago,
Dr. O. Willson of Aurora.
Making the whole number lost.....14
Leaving at this time a total active membership of.....111

At the last meeting Dr. Homer Judd was transferred from corresponding to active membership, on account of his change of residence from St. Louis, Mo., to Alton, Ill.

Dr. F. W. Dean of Des Moines, Ia., and C. W. Stutenroth of Watertown, D. T., were elected corresponding members, which makes the total number of honorary and corresponding members 31.*

The receipts of dues and initiation fees during the year past amounted to $443.00, for which amount the Treasurer's receipt is herewith presented.

Delinquent notices have been sent to members in arrears twice during the year, and to each of those who are now dropped for non-payment of dues a personal letter of warning was recently sent.

Respectfully submitted,

J. W. WASSALL, *Secretary.*

Dr. C. R. Dwight, Treasurer, presented the following report, which was referred to the Executive Committee for auditing, and afterwards reported back with their approval:

PEORIA, May 12, 1885.

Mr. President and Members of the Illinois State Dental Society:

Your Treasurer offers the following Annual Report:

CR.

By cash paid as per voucher No. 57	$25.00
" " " " " 58	50.50
" " " " " 58½	25.00
" " " " " 59	100.00
" " " " " 60	140.50
" " " " " 61	149.00
" " " " " 62	49.25
By exchange	.22
Total disbursements	$539.47

DR.

To cash balance received from past Treasurer	$150.75
" received from Secretary	448.00
	$593.75
Balance in treasury	$54.28

Respectfully submitted,

C. R. DWIGHT, *Treasurer.*

* It was afterwards announced to the society by Dr. Sturgiss that Dr. H. N. Lewis of Quincy, who was an honorary member, had died since the last meeting.—J. W. W.

Dr. Taggart moved that the Chair appoint a committee to draft resolutions in memory of Dr. S. H. Verbeck and Dr. D. B. Baker, deceased members. The motion prevailed, and the committee appointed consisted of Drs. Taggart, Gilmer and K. B. Davis.

The adoption of Dr. Sitherwood's amendment to the By-Laws, providing for "student or probationary members," was moved and lost.

Dr. Taylor moved that the rules be suspended, and the society proceed to the election of two members of the Executive Committee.

Dr. Noyes moved as a substitute that the election of two members of the Executive Committee be made a special order this afternoon, under the order of miscellaneous business. This was amended by Dr. Cushing, making the number to be elected three instead of two. The substitute as amended was carried.

It was moved to adopt the amendments offered by Dr. Noyes at the last meeting, concerning the establishment of a Committee on Publication, and its powers; concerning corresponding and honorary members, and creating the office of Assistant Secretary. They were each adopted.

Dr. Jas. G. Reid, chairman of Committee on Infractions of the Code of Ethics, was, on his request, granted further time to report.

Vice-President Mark H. Patten then took the chair, and the Annual Address to the society was delivered by the President, after which the society adjourned to meet at 2:30 P. M.

FIRST DAY.—AFTERNOON SESSION.

The society met at 2:45 P. M. President Townsend in the chair.

The minutes of the morning session were read, corrected and approved.

On motion, physicians of Peoria and visiting dentists from other States were invited to take part in the discussions.

The election of the Executive Committee, which had been made a special order for this time, was then proceeded with, and resulted in the choice of:

Dr. Edmund Noyes, chairman, to serve one year.

Dr. E. J. Green, to serve two years.

Dr. W. H. Taggart, to serve three years.

The Secretary stated that Prof. J. Taft and Dr. Wendel had written that they would be unable to read papers at this meeting, as announced on the printed program.

Dr. Brophy moved that the sum of $100.00 be placed at the disposal of the Illinois State Board of Dental Examiners, to be used by them, if required, in case they became involved in litigation. The motion was carried.

Dr. Swain, for the Board of Examiners, reported, recommending the following-named gentlemen for active membership, who were balloted for separately and elected:

A. G. Gray, D.D.S., Tonica.
Adelbert T. Olmsted, D.D.S., Peru.
R. H. Kimball, D.D.S., Chicago.
J. F. Davenport, D.D.S., Chicago.
Chas. H. Thayer, D.D.S., Chicago.
L. L. Davis, D.D.S., Chicago.

On motion, it was decided not to discuss the President's Address.

Dr. C. R. E. Koch, Chairman of the Committee on Dental Science and Literature, read his annual report.

Dr. Murphy moved its acceptance, and that the recommendations contained therein be concurred in, which was carried.

Dr. J. A. Swasey, chairman of the Committee on Dental Art and Mechanism, was granted further time in which to report.

On motion of Dr. Noyes, the report on Dental Science and Literature was opened for discussion, and was participated in by Drs. Judd, Newkirk, Ottofy, Koch, Crouse, Brophy, Cushing, Taylor, Sturgiss, Black, Wilson and Johnson.

The President appointed Dr. M. L. Hanaford of Rockford to fill the vacancy in the Committee on Dental Science and Literature.

Dr. F. H. Gardiner, Supervisor of Clinics, requested that, inasmuch as careful records and continued observations of all operations performed at our clinics were required, *members* would present themselves as patients.

Adjourned to meet at 9 A. M. Wednesday.

SECOND DAY.—MORNING SESSION.

The society was called to order at 9:30 o'clock A. M., President Townsend in the chair.

The minutes of the preceding session were read, corrected and approved.

At the suggestion of Drs. C. J. Tibbets and S. M. Sturgiss of Quincy, and on motion of Dr. Noyes, the committee appointed to draft resolutions in memory of deceased members was instructed to include the name of the late Dr. H. N. Lewis of Quincy in their report, and at their discretion [and the Secretary's, who was added to the committee] to devote a page in the printed Transactions to his memory.

Dr. Jas. G. Reid, chairman of the Committee on Infractions of the Code of Ethics, reported that during the past year but one case of an irregular nature had come to their notice, and that it had been happily corrected by the proper correspondence.

The Board of Examiners reported, recommending the following-named candidates for active membership, who were separately balloted for and elected :

A. F. Hawley, D.D.S., Rock Island.
J. M. Fulton, D.D.S., Bloomington.
J. C. Herron, D.D.S., Olney.
G. S. Salomon, D.D.S., Chicago.
W. B. Smith, D.D.S., Chicago.

On motion, the discussion on Dr. Koch's report was declared closed.

The society then listened to the reading of an essay by Dr. K. B. Davis of Springfield, entitled "Prosthetic Dentistry," the discussion of which was opened by Dr. E. D. Swain of Chicago, who was followed by Drs. Patrick, Black, Ottofy, Spalding, Newkirk, A. W. Freeman, Stevens, President Townsend, Prichett, Allport, Noyes, Salomon, Sitherwood, Call and Taylor.

Adjourned to meet at 2 P. M.

SECOND DAY.—AFTERNOON SESSION.

The society was called to order at 2:45 P. M., President Townsend in the chair.

The minutes of the morning session were read, corrected and approved.

Dr. Louis Ottofy offered the following amendment to the By-Laws, which will lie over one year before being acted on :

Amendment to Section 1 of Article III of the By-Laws :

The names of all candidates for active membership to be voted for shall be posted conspicuously in the room where the society meets, and in case more than one candidate is to be voted for at one time the ballot of each voter shall contain

the names of all the candidates, and opposite each name the voter shall express his choice as to the admission or non-admission to membership of such candidate. Any candidate for membership who has once been voted upon and rejected shall not have his name proposed again until the next annual meeting.

Dr. Koch moved that Dr. Ottofy's amendment be made a rule to govern the elections of members during the present meeting. The motion was carried.

The Board of Examiners recommended the following-named gentlemen for active membership, who were balloted for and elected: R. W. Bailey, D.D.S., Macomb, and Dr. I. A. Freeman, Chicago.

The discussion of Dr. K. B. Davis's paper on "Prosthetic Dentistry" was then continued by Drs. I. P. Wilson of Burlington, Iowa, Allport, Brophy, Taylor and Reid, and the subject passed.

Dr. Garrett Newkirk of Chicago read an essay entitled "Nervous Matter and Principles of Nervous Action."

The discussion was opened by Dr. Homer Judd, who was followed by Drs. Spalding, Fitch, Patrick, Taylor, Black, Rohland, J. A. W. Davis and Nelson, and the subject was passed.

Dr. J. J. R. Patrick of Belleville read his paper entitled "Errors in Practice not Always Disadvantageous."

The discussion was opened by Dr. Wm. N. Morrison of St. Louis, who was followed by Drs. Allport, Patrick and Crouse.

Adjourned to meet at 8 P. M.

SECOND DAY.—EVENING SESSION.

The society was called to order at 8:15 P. M., the President in the chair.

The minutes of the afternoon session were read, corrected and approved.

Dr. Swasey, chairman of the Committee on Dental Art and Mechanism, was granted permission to postpone the making of his report until Thursday afternoon, after the clinics had been held.

The discussion of Dr. Patrick's essay was then resumed, and participated in by Drs. Black, Taylor, President Townsend, Drs. Crouse, Rohland, Brophy, Allport, Spalding, Nelson and Swain, and the subject was passed.

The society next listened to an essay by Dr. Louis Ottofy of Chicago, entitled "Dental Spiritualism."

Adjourned to meet Thursday afternoon, at 2:30 o'clock.

THIRD DAY.—MORNING DEVOTED TO CLINICS.

Clinics were given by the following gentlemen:

Dr. G. S. Salomon, Chicago.
Dr. Edmund Noyes, Chicago.
Dr. A. E. Matteson, Chicago.
Dr. J. G. Reid, Chicago.
Dr. A. W. Harlan, Chicago.
Dr. W. C. Wendell, Milwaukee.
Dr. T. L. Gilmer, Quincy.
Dr. C. J. Tibbetts, Quincy.
Dr. E. B. Call, Peoria.

Dr. W. N. Morrison of St. Louis melted platinum by means of a combination of coal and nitrous oxide gases.

Dr. T. W. Brophy, Chicago, operated for the removal of an epulitic tumor.

FRANK H. GARDINER,
Supervisor of Clinics.

THIRD DAY.—AFTERNOON SESSION.

The society met at 3 o'clock P. M., the President in the chair.

The minutes of the morning session were read and approved.

Dr. Louis Ottofy offered a preamble and resolution, which was discussed by Drs. Koch and Pruyn. Its phraseology was slightly changed, and it was unanimously adopted. It reads as follows:

WHEREAS, The State Board of Dental Examiners are performing their duty with great fidelity, impartiality, and thoroughness, and with much expense to themselves of both time and money; therefore, be it

Resolved, That this society highly commends the actions of said board, and hereby cordially sustains them in their official actions, and that it hereby unanimously approves and commends the efforts of the board in their endeavor to raise the standard of the profession to the level to which it properly belongs.

Dr. Allport made some remarks concerning the Dental Section of the International Medical Congress to be held in 1887, and requested members of this society to contribute pathological specimens to the Army Medical Museum at Washington, D. C.

Dr. Jas. A. Swasey, chairman of the Committee on Dental Art and Mechanism, made the annual report, which was accepted, on motion of Dr. Magill.

The discussion of Dr. Ottofy's paper was then opened by Dr. Patrick, who was followed by Dr. Spalding. Subject passed.

Dr. Geo. H. Cushing of Chicago read his essay entitled, "Operative Dentistry." Its discussion was opened by Dr. W. H. Taggart, and participated in by Drs. Kulp of Davenport, McKellops of St. Louis, and Newkirk.

Dr. Koch moved that the further discussion of this subject be postponed till after the presentation of the report of the Supervisor of Clinics at the evening session. Carried.

The Board of Examiners recommended for active membership: Dr. Gilman T. Smith of Princeton and L. F. Dayan of Hyde Park; and for corresponding membership, Dr. J. H. Bowman of St. Louis, Mo., and C. V. Baldwin of Los Angeles, Cal., who were elected.

Adjourned to meet at 8 P. M.

THIRD DAY.—EVENING SESSION.

The society met at 8:15 o'clock, the President, Dr. Townsend, in the chair.

The minutes of the afternoon session were read and approved.

Dr. Newkirk gave notice that the next annual meeting of the Central Illinois Dental Society would be held at Bloomington, beginning the second Tuesday in October, 1885.

Dr. F. H. Gardiner, Supervisor of Clinics, made his annual report, which was followed by a general discussion of the subject of Operative Dentistry. The gentlemen taking part were Drs. Salomon, Ingersoll, Tibbets, Black, A. E. Matteson, Brophy, Crouse, Allport, Kulp, McKellops, Harlan, Ames, Ottofy, Reid, A. W. Freeman, Green, Spalding, Taylor, and the President.

At 11 P. M. the subject of Operative Dentistry was passed, and the society adjourned to meet Friday, at 9 A. M.

FOURTH DAY.—MORNING SESSION.

The society was called to order at 9:30 A. M., President Townsend in the chair.

The minutes of the preceding session were read and approved.

The President re-appointed Dr. W. H. Taggart of Freeport to fill the vacancy in the Committee on Dental Art and Mechanism.

The President nominated and the society re-elected Dr. E. D. Swain of Chicago to serve another term on the Board of Examiners.

The Executive Committee reported that the annual reports of the Publication Committee, Secretary and Treasurer were found correct.

The report was adopted by motion.

Dr. G. V. Black, chairman of the committee appointed to consider the propriety of establishing a new dental periodical, reported that it was not deemed advisable by the committee to establish a new journal *at the present time;* that some further time will be required in which to perfect plans for a journal which shall take an advanced standing in dental literature. The committee was continued.

Dr. G. V. Black moved that the Chair appoint a committee to devise means of so disposing of the routine business of this society that there shall be more time left which can be devoted to the scientific work—said committee to report at the next annual meeting.

The motion was carried, and the Chair afterwards appointed Drs. Black, Marshall and Koch as such committee.

Dr. Taggart, chairman of the committee appointed to prepare memorial resolutions for deceased members, presented his report.*

Dr. S. M. Sturgiss addressed the society, paying a tribute to the memory of the late Dr. H. N. Lewis of Quincy. On motion, the report was accepted.

The Executive Committee announced the expenses of the meeting as $77.55, which amount was allowed, on motion of Dr. Ottofy.

Dr. C. W. Spalding then read his essay entitled "Inflammation," the discussion of which was opened by Dr. Black, who was followed by Drs. Ingersoll, Ottofy and Brophy.

Subject passed.

Dr. A. W. Harlan of Chicago read his "Notes on New Remedies."

A discussion followed, which was participated in by Drs. Marshall, Black, Gilmer, Rohland, Spalding, Cormany, Duncan, Magill, Taylor, Green, Cushing, Ingersoll, Gardiner, Noyes and Swain, and the subject was passed.

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*These resolutions, and the remarks which followed by Dr. Sturgiss, will be found at the end of these minutes.

Dr. Patrick informed the society of a case of malpractice lately occurring in Belleville, which was referred to the Illinois State Board of Dental Examiners.

Adjourned to meet at 2:30 P. M.

FOURTH DAY.—AFTERNOON SESSION.

The society was called to order at 2:15 P. M., the President, Dr. Townsend, in the chair.

The minutes of the morning session were read and approved.

Dr. T. L. Gilmer moved that inasmuch as Dr. Brophy may have had some valuable matter prepared with which to open the discussion on Dr. Wendel's paper,* he be requested to prepare it for the printed proceedings. Carried.

Dr. T. W. Prichett of Whitehall described a case he had had in practice, exhibiting models explanatory thereof.

Dr. Swain rose to urge those present to remember the request of Dr. Black, viz., that specimens of secondary dentinal deposit occuring over pulps which had been capped would, if sent to him, render valuable aid in a line of study he was now engaged in.

Dr. Cushing offered the following resolution, which was adopted:

Resolved, That the thanks of this society are hereby tendered to the Mayor and Council of the city of Peoria, for their kindness in offering the Council Chamber for the use of the society upon this occasion, although not occupied by us; and to the School Inspectors for the use of the rooms of the Board of Education, which we have occupied, but especially to Prof. Dougherty, who at much inconvenience vacated his personal offices in order to furnish us the admirable accommodations we have enjoyed during this session.

Election.

The annual election of officers resulted as follows:

President—T. L. Gilmer of Quincy.
Vice-President—W. B. Woodward of Peoria.
Secretary—J. W. Wassall of Chicago.
Treasurer—C. B. Rohland of Alton.
Librarian—W. B. Ames of Chicago.

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*Dr. Wendel's paper was announced on the printed program, but not read before the society.

Dr. Koch offered the following resolution, which was adopted:

Resolved, That it be the duty of the Librarian-elect to obtain the cabinet photographs, so far as possible, of all the members of this society deceased, and likewise of the present members, and properly arrange the same in a suitable album or albums, to be procured by him; and that the photographs of future members shall be added from time to time by the successive Librarians of this society, who are to be the custodians of these albums, which they are to have present for the inspection of the members of the society, at each annual meeting.

The resignation of President-elect Gilmer as a member of the Board of Examiners was presented and accepted. The Chair nominated and the society elected Dr. J. D. Moody of Mendota to fill the vacancy.

Dr. W. H. Taggart offered his resignation as a member of the Committee on Dental Art and Mechanism, which the society accepted.

Dr. W. T. Magill of Rock Island was appointed by the Chair to fill the vacancy.

Dr. P. J. Kester of Chicago was nominated by the Secretary and elected by the society Assistant Secretary for the ensuing year.

Dr. Koch moved that $100.00 be appropriated for salary of Secretary, and $25.00 for salary of Assistant Secretary. Carried.

The vote for the place of the next annual meeting resulted in the choice of Rock Island.

On motion of Dr. Brophy, the President and Secretary were authorized to issue certificates of delegation to the American Dental Association to all members applying up to the full quota.

On motion of Dr. Taylor, the President-elect was installed, and ex-President Townsend introduced his successor and said:

Mr President and Gentlemen:

To be a member of the Illinois State Dental Society is something of which any dentist may well be proud. To preside over the deliberations of such a body is, of course, a still greater honor, and one to which I never aspired, although I appreciate very highly your kindness in conferring this honor upon me; and to say that I *sincerely regret* the condition of ill health which has almost entirely incapacitated me for work during this meeting, is but *feebly* to express myself. Allow me to thank you for your kindness and forbear-

ance, and to ask your forgiveness for the many mistakes which, owing to my physical condition, were unavoidable.

On motion, the Executive Committee was authorized to appoint a Local Committee of Arrangements at Rock Island for the next annual meeting.

The President was appointed, by motion, to deliver the next Annual Address before the society.

A vote of thanks was offered to the railroads, retiring officers, and especially the Executive Committee.

President Gilmer appointed as members of the Committee on Infractions of the Code of Ethics: Drs. C. J. Tibbets of Quincy, Louis Ottofy of Chicago, and H. H. Fitch of Quincy. The Chair re-appointed Dr. Frank H. Gardiner Supervisor of Clinics.

Dr. Gardiner moved that the Librarian, by and with the consent of the Executive Committee, be authorized to expend $50 in procuring models, manikins, etc., for the purpose of illustration at our meetings. Carried.

The Committee on Examination of Skulls in Museums was continued.

Dr. Gardiner gave notice that he had appointed Drs. J. G. Reid of Chicago and C. R. Taylor of Streator as assistants to the Supervisor of Clinics.

The minutes of this session were read and approved.

On motion of Dr. Sturgiss, the meeting adjourned.

The next annual meeting will be held in Rock Island, Ill., beginning Tuesday, May 11, 1886, and continuing four days.

J. W. Wassall, *Secretary.*

IN MEMORIAM.

The committee appointed to report resolutions expressing the sense of this association upon the death of Drs. H. N. Lewis and D. B. Baker of Quincy, and S. H. Verbeck of Lena, members of this body, presented the following, which were adopted:

Resolved, That in the death of Dr. Lewis the society has lost one of its oldest and most honored members, he having been elected to preside over its second annual meeting, in which capacity he served the association with ability, and has ever continued to be held in the highest esteem by his colleagues and neighbors; that in the death of Dr. Baker one has been taken from us who was devoting his best efforts to that branch of our specialty known as prothetic dentistry, in which he excelled; and in the untimely demise of Dr. S. H. Verbeck we have had taken from us one of our youngest and most promising members, who, although just fairly entering upon his professional career, had demonstrated that he was destined, had he lived, to have occupied a position in the foremost ranks of his chosen profession.

Resolved, That these resolutions be placed upon the records of the association, and that a copy of the proceedings be sent the families of the deceased.

W. H. Taggart, *Chairman;*
T. L. Gilmer,
K. B. Davis.

Dr. Sturgiss said: Mr. President and gentlemen, before the adoption of this report, it is my sad duty to say a few words respecting my old and much esteemed friend, the late Dr. H. N. Lewis of Quincy. We were together members of the same profession for more than thirty years, and I had learned to reverence him as a father. He had the honor of being the second president of this society. It was my privilege to be with him all through his professional life, and it was my painful duty to help bear him to his last resting place. He was ever ready to help a brother dentist, and I should be recreant to every principle which constitutes a man, did I not now pay some tribute of love and respect to his memory.

Addresses, Essays, and Discussions.

ANNUAL ADDRESS.

BY THE PRESIDENT, DR. H. H. TOWNSEND OF PONTIAC, ILL.

Gentlemen of the Illinois State Dental Society:

Another year, with its sunshine and shadows, its hopes and disappointments, its successes and defeats, its pleasures and trials, has passed into eternity. Its labors have been accomplished, the cares of business laid aside, and we are again assembled at our annual reunion to compare notes, consider the work done since our last meeting, interchange thoughts and experiences with our professional brothers, that all may be benefited; and return to our homes at the close of the convention with renewed energy, increased devotion to our profession, a clearer comprehension of the mysteries surrounding us on every hand, and it is hoped better prepared to surmount the difficulties which daily beset our pathway. Nor is this all. We have met in this beautiful city of Peoria, on this May morning, to celebrate the twenty-first annual meeting of this association; and it affords us pleasure to have the honor of welcoming you to this the twenty-first birthday anniversary of the Illinois State Dental Society, which is in its infancy and youth no longer, having this day attained its majority and now rejoicing in the full vigor of manhood.

As the past, present, and future of dentistry have been a frequent topic for able writers, both in dental societies and periodical literature, and as the history of this society was so eloquently and interestingly presented at our last meeting by an eminent brother from Chicago, and as the able and energetic committees appointed for that purpose will report all that is new and important in dental science, literature, and art, it seemed to us that a few thoughts upon dental societies and dental society work in their relations to dental practice might not be inappropriate as an introduction to the intellectual feast now awaiting us.

In the language of the preamble to our constitution, this society was organized "to cultivate the science and art of dentistry, and all its collateral branches; to elevate and sustain the professional character of dentists, and to promote among them mutual improvement, social intercourse, and good will."

That it has been true to it mission, the present status of the profession in our State compared with that of twenty years ago is convincing proof. The noble efforts of the leaders of this society are what has elevated it to its present high standard, and benefited the profession throughout the entire State; and the eminent men who have so kindly and unselfishly sacrificed their time, pleasure, money, and health for this association and the good of the profession have also been rewarded; the efforts which they have put forth for the good of others have reacted to their advancement.

What but the stimulus of dental society work has produced such men as the secretary of our State Board, our skilled microscopist and scientist from Jacksonville, our materia-medica friend from Chicago, and a score of others whom we all delight to honor? While this association has been largely instrumental in developing these men, what would the society have been without them? They have helped make the society what it is, and it in turn has assisted them to a higher plane of excellence.

It would be difficult to say which has received the greater benefit, this society, or the men who have labored so hard these many years for its advancement; and this illustrates an important fact which we desire to emphasize, viz.: that the time spent in dental society work and in imparting to others the results of our own experience and investigations is not lost, but that the giver will often be the one most benefited.

This society has attained a position second to none, and the achievements of the past suggest the possibilities of what *may* be accomplished in the future.

Could we but retain all who meet with us, and induce them to attend every meeting, and come in time to be present at the opening session; to remain until the close of the meeting, and spend less time in sight-seeing, our membership would not only be more satisfactory, but greater good would result from our labors. It is difficult to conceive why it is, that of the nearly nine hundred dentists practicing in this State, but one hundred and sixteen, or about twelve per cent., are members of this society; while in our neighboring State of Indiana thirty-three per cent. are mem-

bers of the State society, and Dakota Territory has a membership of about fifty per cent. It has been said that dental societies are to the practitioner what dental colleges are to the student, and we think there can be no question but that every one can learn *something* from another who is engaged in the same calling as himself; and the advantages of associated effort are now so generally recognized, that nearly all the professions, trades, and in fact almost all classes of business, have their associations.

It was our good fortune twenty years ago to have had the friendship of the lamented Dr. B. T. Whitney of Buffalo, one of the noblest-hearted men that ever adorned the profession; and being located near him, it was our privilege to seek his counsel and advice, until we removed to this State, and we still corresponded with him until his untimely death. Well do we remember the words of advice contained in one of his letters, which were these: "Go at once, my friend, into the dental societies of your State; they are the best educators to a practitioner of any institutions in the land."

We sought the first opportunity of following his admonition, and fourteen years ago met with you in this city of Peoria. It seemed to us that we learned more about dentistry in those three days than all we had ever known before, and our only regrets were that we had not earlier availed ourselves of the benefits of this association, that the meeting was *so short*, and that it would be a *whole year* before we could have another such a treat.

We went home full of enthusiasm, and firmly resolved never to miss another meeting of this society, unless compelled to do so by illness, or some other unavoidable cause, and, thanks to a kind Providence, have ever since been permitted to attend. Many come to our meetings who take no part in the work, and consequently but little interest in the proceedings.

It has been suggested that, if the new members and those who lack interest could be given some work to do, they would become interested, and be more regular in their attendance. We think the suggestion a good one, and worthy your consideration. The moment a member is asked to do something, that moment he begins to feel at home, and that he is a part of the society.

The character of the work done by this association has changed considerably in the past few years. Formerly it was more of the practical and manipulative, considerable attention being given to the details of practice; latterly it has partaken more of the theoretical and scientific nature, and questions involving deep study and

extended research and investigation are now being considered. Both of these are necessary, and neither can be ignored without injury to the society.

The scientific is essential to an understanding of the origin and formation of the dental organs, the causes which operate to promote or retard their development, and the influences which are conducive to their health, or productive of disease.

Through the persistent efforts of scientific investigators, the causes of dental caries are now perhaps more nearly demonstrated than at any previous time in our history.

To investigate successfully in this direction, a medical education seems to be necessary, and indeed we believe, other things being equal, that the dentist who possesses this medical knowledge is not only better prepared to investigate intelligently, but is also better qualified to treat successfully the diseases of the oral cavity, and to diagnose correctly whether they are of local or constitutional origin or both.

Why should the oculist be required to study general medicine any more than the dentist? Both are specialists and treat diseased conditions, and to be successful in their respective fields must have frequent recourse to constitutional remedies.

It has been the great sorrow of our life that we have not a thorough medical education. We daily feel the need of this, and the more we strive to benefit our patients the more fully do we realize the necessity of a more comprehensive knowledge of the human machine, its diseases and their treatment, that we may understandingly meet and more successfully combat the pathological conditions for which we are daily called upon to prescribe, instead of blindly groping our way in the dark. Four years ago, when we thought we saw in the near future the opportunity of obtaining this medical knowledge, we applied to the general practitioner for relief from a slight affection of the eyes,—an irritation of the conjunctiva,—instead of consulting an oculist, and the result was that in less than three hours our eyes were nearly ruined, and have never so far recovered as to allow us to read or write by an artificial light excepting for a few minutes at a time, and this has delayed, if not defeated, our long cherished object; but as hope is necessary to success in all human achievements, we still hope to obtain this much desired information.

We believe, as a rule, the general practitioner is no better qualified to treat dental lesions than he is those of the eye, and therefore

it seems to us as necessary for the dentist to combine both the medical and special knowledge as for the oculist or any other medical specialist.

Good manipulative ability and mechanical ingenuity are not only essential to the practitioner of dentistry, but absolutely indispensable. A dentist may be the possessor of the most thorough medical education, and his fillings, if defective, will preserve the teeth of his patients no better than they would if inserted by the most ignorant quack; neither will illy-fitting artificial dentures from his hands be worn with any greater comfort than if constructed by one of less scientific ability; hence it is that, in our profession, the medical knowledge, the operative skill, and the mechanical ingenuity must go hand in hand.

The clinics have always been a valuable feature of this society, and formerly two half-days of each meeting were devoted to this purpose, instead of one half-day, as at present; and it may perhaps be questioned whether the change has been a wise one. Possibly one half-day for clinics exclusively, and one for the construction of artificial dentures, crowns, etc., might be advantageous. If the operators would give a lecture upon the operations as they proceed, explaining *why* this wall is cut away or that one left, or why they use retaining pits or do *not* use them; in short, tell us at each successive step in the operation why they do thus and so, and if the gentlemen would decide which operation they desire to witness, and observe it closely from its commencement to its completion, instead of going about from chair to chair, and ascertaining simply that Dr. A. is filling an incisor, Dr. B. a molar, and Dr. C. a biscuspid, and learning little or nothing of the whys and wherefores of the different operations, or the special methods of the operators, it seems to us much greater good would result from our clinics, and vastly more practical knowledge be obtained.

This society is to be congratulated upon its able and efficient members who excel in their special fields of dental science and art. If some of these gentlemen would give us a clinic in the use of anesthetics, demonstrating the administration of ether and nitrous oxide, explaining the precautions to be observed in their use, and the various methods of resuscitation, including artificial respiration, it might not be time and labor lost.

Again, if a committee, with Dr. Black for chairman, would investigate during the next year, and report at the next meeting, the disease known as pyorrhea alveolaris,—its ætiology; whether of

local or constitutional origin, or both; its influence on the general health, and *vice versa;* what prophylactics, if any, can be relied upon to prevent its appearance; what the dangers, if any, of pyæmia; to what extent it is contagious; its treatment, and the precautions to be observed in connection therewith; the best means of disinfecting instruments, etc.,—this also might be a benefit to this society and the profession at large.

There is room for investigation and invention in the direction of a more perfect base for artificial teeth. We need a material as inexpensive and easily manipulated as rubber, as good a conductor as gold, free from mercury and all deleterious substances, and of a variety of shades so nearly resembling the natural gums as to admit the use of plain teeth. If a committee, selected with special reference to their inventive genius and ability, would apply themselves in search of such a compound or material, it might prove a boon alike to the public and the profession.

A cheap filling material is also required to supply the place of amalgam; a substance that will neither discolor, shrink, nor expand; one that is a poor conductor; that will not be acted upon by the fluids of the mouth; contains no poisons; that can be contoured, and will make a comparatively permanent filling,—something of the nature of the oxyphosphate cements, but more permanent. Here, also, is work for a special committee, and the fruit of their labors, if successful, would be hailed with joy by the profession.

To obtain the most successful results and the greatest good in any convention, all jealousies and all personalities should, if possible, be laid aside, and the good of the society kept constantly in view. It is said there are dental politicians, who engage in a sort of political "wire-pulling," to gratify personal ambitions.

There are, doubtless, cases of this kind, and will continue to be so long as human nature remains what it is at present. Even our churches and secret societies are to some extent the victims of designing men, who seek their own aggrandizement; but we believe this society to be as free from all such objections as an organization of this kind can well be.

Possibly the younger members have not always received sufficient encouragement to take part in the discussions. We may have listened somewhat more attentively to the remarks of the older and more prominent members than to those of a stranger. This is, of course, quite natural, but should be guarded against.

Have we not also occasionally erred in speaking disparagingly of

new methods and inventions which we have never tried, and thereby deterred others from investigating their merits. We fear unintentional injustice is sometimes done in not paying sufficient respect and attention to the remarks of a stranger, and by condemning too hastily new methods and inventions which we have never proven.

While it is desirable to conform as nearly as practicable to parliamentary rules, it is perhaps better to ignore an occasional slight breach of decorum than to waste much valuable time in discussing mere technicalities of questions of order.

We believe more dental societies are needed in this State, that the profession outside the large cities may avail themselves of the benefits of more than one dental meeting a year. To supply in some degree this long-felt want, the Central Illinois Dental Society was organized, and is already doing a good work, and our genial friend who presided at its last meeting never did a more beneficial act than when he conceived the organization of that society. There is still room for several more such organizations in this State. Certainly a Northern, a Southern, a Western, and an Eastern Illinois Dental Society would be blessings to the dentists practicing in those localities.

The future of our profession is full of hope. The mists of doubt and discouragement are clearing away, and the dim outlines of the long looked for high professional standard are fast becoming visible through the sunlight of united college faculties, the State boards of examiners, and the State dental laws. The outlook of this society is flattering in the extreme. We are proud to number among our members, as zealous workers, as scientific investigators, and as skillful operators as can be found in the dental profession of this or any other country.

It is with many misgivings that we enter upon the duties of this office; being painfully aware of our own inability to fill such a position, but trusting that the kind feelings of friendship which placed us here will enable you to bear with us in the mistakes which we are certain to make, and asking your kind indulgence and assistance, promise to serve you to the best of our ability.

PROSTHETIC DENTISTRY.

BY DR. K. B. DAVIS OF SPRINGFIELD, ILL.

This department of dental practice has not for many years received that attention which its great importance demands. It seems that a very large class of practitioners almost utterly ignore it. It is year by year apparently receiving less attention at the hands of those who are competent to elevate it to a higher plane. Various causes have combined to bring about this result. Among these may be mentioned the introduction of the various cheap bases, sectional gum teeth, and the false assumption that the operative department of practice is more refined and honorable,—that it alone is worthy the exercise of our highest faculties and aspirations in the pursuance of our profession, and that any mere mechanic, wholly unqualified by education in science and art, is deemed competent to practice the other.

To that very large and unfortunate class who are compelled to ask aid from this department of practice this is a subject of vast importance. We may proclaim to them the great benefits of conservative practice upon the teeth, but it has no interest to them. Their teeth have already been sacrificed to the forceps, and they are no longer interested in the so-called operative department of our profession. But they *are* deeply interested in the *prosthetic* department of practice, and will gladly hail any marked improvement that promises to restore to the oral cavity every function that was swept away with the loss of the natural dental organs.

The natural teeth perform five different functions:

First. They give form, beauty, and character to the face and mouth.

Second. They give expression to the face, in every presentment. The various mental conditions are clearly set forth, and this is especially true of the emotions and the stronger operations of the mind.

Third. Speech. They control the voice and aid enunciation.

Fourth. They facilitate the use of the soft parts, and serve to retain them in their normal relations.

Fifth. Mastication. The welfare of the entire system is in a great measure dependent upon this function of the teeth.

In contemplation of these various functions of the natural teeth, what is the duty of the dentist when these organs are lost? It is certainly the duty of every practitioner to as faithfully restore all of the above-mentioned functions as lies within the power of art, science, and experience. Our best efforts in this direction will often fail to accomplish a full restoration of all of these functions, but, when the aim is a sorry attempt at the restoration of only one or two of them, at the same time entirely overlooking or sadly perverting all the others, is it any wonder that a total failure is frequently the result? We often see artificial teeth that serve the purposes of mastication in a remarkable degree, yet are lacking in every element that goes to restore the natural expression, symmetry, beauty, and the characteristics of the individual.

"In no department of dental practice does the want of that taste which indicates artistic culture become so manifest as in the failure to restore the natural expression by the replacement of lost dental organs. It is undoubtedly true that a large majority of the profession engaged in this branch of practice have given more thought and effort to the best methods of restoring the functions of mastication and speech, giving comfort, usefulness, and durability in the use of artificial dentures, than to the equally important question of correlation of the substitutes with the general characteristics of the patient. To this account are to be charged the unseemly incongruities constantly staring every observer in the face from mouths whose lost organs have been replaced in disregard of this universal law. No matter how anatomically correct or how skillfully adapted for speech and mastication an artificial denture may be, yet if it bear not the relation demanded by age, temperament, and facial contour, it cannot be otherwise than that its artificial character will be apparent to every beholder.

"So, not to multiply examples, the dullest observer learns intuitively the demands of this great law of correlation. The artist's success depends upon the extent of his perception of it. The botanist esteems it a guide-post in his investigations. The comparative anatomist regards it as a fundamental principle. The scientist in every direction of research knows its importance. Its full recognition by the dentist determines his status as an artist, and distinguishes him from the mere mechanic.

"A broad, square face, or an oval one; a delicately organized woman, a miss of eighteen, or a matron of fifty; a brunette, or a blonde,—these and other varieties present as many different types, with teeth in size, shape, color, density, etc., corresponding. If, then, teeth correlated in their characteristics to those which nature assigns to one class be in the mouth of one whose physical organization demands a different order, the effect cannot be otherwise than displeasing to the eye, whether the observer be skilled in perception or intuitively recognizes inharmony without understanding the cause. A careful observation and record of these distinguishing characteristics—correlations—would go far towards establishing Prosthetic Dentistry as an exact science. There is as rich a field thus opened, and as worthy of culture and development, as any in the operative department of practice; an opportunity as promising as that which incites others to perfection in structural prosthetics, and a reward in professional status and pecuniary remuneration not less deserved than that which is accorded to superiority in any other branch of practice."

In every public assembly, on the street, in the drawing-room, or wherever we may turn, we see such a display of these disgraceful productions of dental mechanics that it is becoming a reproach to the dental profession.

Let us now consider some of the methods that should be adopted to remedy the existing evils in this department of our practice.

There are no new methods worthy of mention in the construction of plates, but if those long in use are only properly directed and developed in accordance with the above-mentioned requisites for the restoration of the natural characteristics of each individual patient, what a wonderful transformation would soon occur in prosthetic practice!

How can this much desired result be secured? It can only be brought about by an abandonment of the present methods of the almost universal use of cheap vegetable bases and sectional gum teeth. It is utterly impossible to secure anything like artistic results by the use of sectional gum teeth. This is certainly obvious to every practitioner. There is great variety in the shape, color, size, and arrangement of the natural teeth. Artificial substitutes should be made to resemble the natural teeth so closely in every particular as to prevent their detection by any observer. Can they be thus made? To do this we must abandon the use of sectional gum-blocks, and in all cases resort to the use of single plain teeth. In

the use of these we have ample opportunity for the exercise of the highest art, in our efforts at the restoration of the original characteristics of each individual patient. These teeth are supplied by the makers in sufficient variety, in regard to color, shape, size, and natural life-like characteristics, as to be made to very closely imitate the natural organs.

The natural teeth are by no means always of regular shape, nor are they all of the same color in the same mouth, and they are more or less worn on the cutting edges of the anterior teeth; so that in persons of thirty or more years of age they present a very different appearance from what they did at eighteen or twenty years of age.

In selecting teeth for each case, great care should be exercised to have them correspond in color, size, and general characteristics to the lower teeth in cases where they are still remaining. After selecting and preparing the teeth for each case, the next step is to properly arrange them. To accomplish this requires time, patience, and more than ordinary ability. We must not be content when we have them so arranged that they will neither be too short nor too long; of the proper color, shape, and size, or that the articulation is correct. These essential points must all be observed, but something more than this must be accomplished if we wish to fully restore all that was lost in the natural organs. We should always arrange the teeth with great care; then seat the patient in a chair, try them in, and carefully note the expression of the patient under varied conditions, and if they are not perfectly satisfactory, re-arrange and try again, and keep repeating this process until we are perfectly satisfied that the results are just what we wish them to be.

We now come to a consideration of the various bases for artificial teeth. Gold is undoubtedly the best base for partial plates. Its conductive properties, combined with its strength and thinness, render it peculiarly serviceable for partial plates. For entire plates it is not equalled by anything, unless it be continuous gum, and in special cases it is preferable to that. A full set mounted upon twenty-carat gold, using single plain teeth, and soldering them on to the plate and making the gum of stippled celluloid, with the New-Mode Heater, makes as strong and almost as life-like a denture as continuous gum on platinum.

Taking into consideration the deleterious effects of rubber and celluloid as non-conducting bases, and other well known objections, is it not surprising that nine-tenths of the dentists will still persist

in their universal use to the detriment of both themselves and their patients? A very large proportion of our practitioners have never learned to use gold or any other metal as a base for plates. If they could by any means be made to realize the extent of the injury to the mouths of hundreds of patients by the use of the vegetable bases, and if they are actuated by an honorable desire to fulfill every professional obligation they owe to the public, they cannot longer continue to use bases that are known to produce universally abnormal results.

Dr. W. H. Dorrance, of Ann Arbor, Mich., read a paper before the American Dental Association, at the Cincinnati meeting in 1882, upon the ill effects produced by the wearing of artificial dentures on plastic bases, in which he gives his observations as to the results of 211 upper partial and full cases, 165 of which were rubber and 46 celluloid; and 47 per cent. showed a diseased condition in an aggravated form. In 91 per cent. these effects were marked, and in the remaining 9 per cent. there were no effects at all. The average time of wearing these plates was two and two-third years. In many of these observed cases the congested condition extended beyond the borders of the denture to the throat, and was doubtless complicated with general pathological conditions. Of the 211 cases above mentioned, Dr. Dorrance replaced 126 with metallic plates after such treatment as was indicated. Of this number of cases he kept enough under his observation to give a fair estimate of the value of the change, and the improvement was very marked. In all cases the patients expressed appreciation of and gratification for the change.

These observations can doubtless be corroborated by many other practitioners, and they all go to demonstrate the injurious effects from plastic bases, and most certainly force us to the conclusion that they should not be used. If we are disposed to do entire justice to those who need artificial substitutes, we must see that they are supplied with what we know is proper for them, and thus secure the best results; and any dentist certainly places himself in a very bad light before his own conscience if he longer refuses to qualify himself to render as meritorious services as does any other practitioner in the entire profession.

Continuous gum on a platinum base is undoubtedly, when properly made, more nearly perfect than any other material for entire dentures. It has its objections, as have all other kinds of artificial plates. Its merits are highly appreciated by all who have worn it. Its construction requires much skill, patience, and artistic taste, but it well

repays all the efforts one may bestow upon it in the unsurpassed beauty of the finished denture and the gratification of the patient. With the various new furnaces now in use its construction is much easier than formerly.

Having thus considered the departments of prosthetic dentistry which relate to the construction of artificial dentures upon the various bases, we now come to a consideration of the merits of artificial crowns and the so-called bridge-work, concerning which so much has been said and written during the last few years.

Whilst it is the province of prosthetic dentistry to supply to the oral cavity any lost organs, it should never be allowed to contravene the conservative efforts of the operative department; consequently it becomes the imperative duty of every operator to preserve every root that can be rendered useful by the most efficient methods of crowning. The merits of the best methods of crowning are so universally admitted at this time that I deem it unnecessary to enter into any argument in regard to the utility and efficiency of this method of saving untold numbers of roots. They can thus be rendered both useful and of vast benefit to the personal appearance, and at the same time we can avoid the very unpleasant annoyance of a plate. Moreover, we are all well aware of the difficulty, not to say the impossibility, of some mouths retaining a plate so as to be used with any degree of comfort. In numberless cases, if we do not resort to crowning, our patients are compelled to wear a plate all through life, merely to supply the loss of one or more teeth. Again, in many instances, it will be far better for both operator and patient to resort to crowning instead of many of the extensive contour fillings, which are often inserted into frail teeth of poor structure.

In regard to the so-called bridge-work, I would not be understood as advocating its extensive use. However, there are frequently cases of the loss of one or more of the anterior teeth, when there are on either side good roots that can be rendered healthy by proper treatment. Upon these roots crowns may be accurately adjusted, to which we may attach one or more teeth, thus supplying the lost intervening tooth, or teeth, as the case may be, and if the entire operation is conducted with extreme care and accuracy, I do not hesitate to say that they will give great satisfaction to the patient, and will be as clean as any other device could possibly be under like circumstances. I do not advocate the insertion of entire dentures upon this method, for obvious reasons; but in those cases above noted we can most assuredly render eminent satisfaction to

our patients and at the same time obviate the necessity of covering the palatine surface of the mouth with a foreign substance.

Discussion.

[Opened by E. D. Swain, D.D.S., of Chicago.]

Dr. Swain. The importance of this question to us as a profession, as well as to the unfortunates who are compelled to seek relief at the hands of those who supply dental substitutes, cannot be overestimated; yet for a time it seemed almost to be forgotten, and to be allowed to fall into the hands of the incompetent, while other branches of our calling were making most rapid strides forward. In fact, it came to be looked upon by most of us as rather disgraceful than otherwise to be able to construct a fine, artistic substitute for the natural teeth.

Just why we should have dropped the word mechanical, and substituted the more uncommon one to designate this class of our handiwork I was at a loss to understand for a while, but supposed it was because it was a more comprehensive term. Upon consulting Webster I discovered that prosthetic means "prefixed," as a letter prefixed to a word. Prosthesis is defined, in surgery, as the addition of an artificial part, to supply a deficit in the body, as an artificial arm, leg, or set of teeth. I learned, therefore, that while we may be allowed to use the term "dental prosthesis" or "prothetic dentistry," we must, to be correct in our English, cease using the adjective "prosthetic."

Much has been said in the past about the advisability of separating our calling into two specialties, to be known as surgical or operative, and mechanical dentistry; but just where to draw the line of demarkation has given rise to considerable discussion. "Dental prosthesis" settles this question until there shall be an improvement in the English language, in that it provides for the addition of artificial parts. Restoration of the lost part of a natural tooth by making a contour filling belongs strictly to the prothetic department; while the manufacture of an appliance to regulate or move the natural teeth must be consigned to the surgical or operative department; the taking of an impression for an artificial substitute must be "surgical"; while the manufacture and insertion of the substitute is "dental prosthesis."

We are all agreed that the man who operates on the teeth of a family is better calculated to insert the substitutes for them, when

lost, than any other man can be, knowing as he must not only the shape, color and other characteristics of the natural organs, but he remembers the expression of the countenance with the natural teeth, and is, therefore, the one to reproduce them.

That the status of mechanical dentistry has, as we are so frequently informed, really deteriorated let us for a moment consider. It is quite true that some years ago, for some very good reasons existing at that time, metal plates went almost into disuse, and in their place vulcanite or hard rubber came into almost general use. Who of us can say that this was *really* a step backwards? While it is true that there exist several serious objections to the material itself, does it not allow greater liberty in the restoration of lost expression and parts, and in the arrangement of teeth, than any other cheap base yet given to our "mutilated victims?" It does not detract, however, from *continuous gum* or *gold* when these materials are indicated by existing conditions. And, again, does it not allow a class of people whom we always have with us to enjoy—because of its less expense—what comforts there may be in artificial dentures?

Who can estimate the number of cases of dyspepsia, and consequent bad health, which have been cured, or at least mitigated, by the use of a set of artificial teeth upon a base of hard rubber?

The world owes much to this class of substitutes for the better health and longer lives of its people. Are not all considerations in regard to the vile coloring matter used, and its non-conductibility, more than counterbalanced by the good it has accomplished? That a better adaptability to the parts is possible with vulcanite than with metals, I deny, providing the metals are properly worked; but that a greater number of dentists are better able with this material than with metal to construct a piece of work which can be worn I will admit; and just here it is that the gravest objections to this material are apparent. Because it is so easy to construct a substitute upon rubber, the temptation to extract, rather than to try to save, teeth is too great. I firmly believe, however, that this great evil is rapidly becoming extinct. The men now entering the profession nearly all attend colleges, and are better instructed in the science of saving the teeth. Every man practicing dentistry should understand the working of metals; he will be a better dentist for it, in all the branches of his profession. If he can so work metals as to construct a dental substitute, he is prepared to provide pivot teeth, which preserve instead of destroying the roots to which they are attached; he is prepared to manufacture and adjust a Richmond or any other

kind of gold crown in such a manner as to be of great comfort and service to the wearer, as well as a credit to himself.

The trouble seems to be, not with the materials, but with the dentists themselves. I have had some experience with young men who were fresh from their colleges, very well instructed in the use and manipulation of the plastic bases, but very deficient in metal work of any kind. If they were instructed in this kind of work, it had been done in such a manner as not to have been firmly fixed in their minds or at the ends of their digits. They had no conception of the metals themselves,—alloys, carat, etc.; could not understand how 18-k. gold could be soldered with 18-k. gold solder, showing a deficiency in their education in metallurgy.

I can now better understand why this is so than I could a few years ago. The management of a certain dental college not long since attempted to overcome this trouble, but found its students utterly opposed to reform in this direction; the student arguing that the vegetable bases afforded them the means of supplying their patrons with substitutes for little money, and with reasonable profit to themselves; furthermore, if their lines were cast for a country practice, they could not encourage better work and compete with the man in the next town. In order to settle the matter, the executive committee of the college resolved that no partial upper dentures should be made in the institution upon a rubber base. By this means all the students were compelled to learn to manipulate gold and silver, and it is to be hoped and expected that these men will be the better for the discipline enforced.

Continuous gum is, without question, the king among dental substitutes, and requires a higher order of skill than for the working of metals alone. It has all the advantages of the plastic base, with none of its objections. But here some knowledge of the manipulation of porcelain must be acquired. It is clean, strong, natural in expression, with only one slight objection,—its weight. The improvements being made in the furnaces, materials used, methods of repair, all have their tendency to make this kind of work more popular with the dentist, and consequently with his patrons; for does not he recommend, as a rule, that class of substitutes most satisfactory to himself, when he feels that his patrons will also be better satisfied?

Of the entire porcelain substitute we cannot at this time speak with so much encouragement, but if ever the difficulties of manipulation which now surround this kind of work are overcome it will

become more popular. It possesses all the beauty and advantages of "continuous gum" without the one fault, weight. The principal difficulty, at present, in its manipulation arises from the shrinkage of the materials in the process of firing. This may be overcome in a great measure when some one shall invent a method of subjecting the body used to a great pressure before being introduced into the furnace, thus not only excluding the water used in mixing, but bringing the particles into close contact. Such a procedure I am sure would also add greatly to the strength of the material.

The combination of porcelain with rubber, as given us by Dr. Land, of Detroit, is by no means a step backwards, but like those mentioned previously requires for its successful manufacture a high degree of proficiency as a metal-worker; a knowledge of porcelain work as well as of rubber.

I have in a few instances used this process with perfect satisfaction to myself and to my patient. This combination is especially adapted to those people who have a short upper lip, with heavy projecting border of the lower edge of the jaw, or, to be plainer, where a heavy undercut exists, so that in laughing teeth and gums are fully exposed.

Of the cast metal plates, or combinations of cast plates with rubber, I have only to say that for lower dentures they are sometimes unequaled, especially where nice adaptation and weight are considerations, combined with light expense to the patient. Furthermore, there has been a constant advance in the methods for retaining dentures, particularly full ones. The Holbrook method has its advantages, and to those of us who have used it it has been of unquestionable value.

There is a gentleman present who has some ideas upon this subject which he expressed in an essay, some weeks ago, proving that good men and good minds are at work endeavoring to advance this department of our profession. The essayist has already made for "dental prosthesis" a claim for crowns mounted upon natural roots. During the past few years there seems to have been almost an epidemic in this direction, and the different methods brought before us are multitudinous, and, like the old fellow's idea of whiskey, "all are good, but some better than others."

Considerable has been published during the year, or the past few months, in one of our leading medical journals, derogatory to the retention of pulpless teeth and crownless roots in the human jaw, which, if true, would make every one present who has attempted

to save such teeth and roots guilty of the grossest malpractice. Fortunately, our experience is worth more to us and to our patrons than the theories advanced by one of the representative journals of the profession which we have for so many years looked upon as our mother. We know that almost from the babyhood of our profession attempts to retain and make serviceable such teeth and roots have been in a great measure successful, and of late years, with increased knowledge in treatment and canal filling, the possibility has become a positive, settled fact. Now, with the first fact accomplished, i. e., the healthfulness of the root secured, why should we not proceed to add to this foundation a superstructure that will make of it a serviceable member? And right here allow me to say that a diseased root cured and put into service is far more likely to remain in a state of health than one crownless and out of service; the slight irritation resulting from use inducing a better circulation of blood in surrounding parts, and consequently better nutrition.

I know, gentlemen, there are those waiting for the floor who have plenty of meat for you upon this subject; therefore I will close these general remarks upon this important subject by saying that, no matter what may be the value of the various materials employed, or the different methods for using them as a base for artificial dentures; no matter what may be the value of the different methods for supplying artificial crowns to single teeth, only he who uses that best adapted to the individual case can be said to be a successful practitioner of "dental prosthesis."

Dr. Patrick. In order to obtain a good model of the mouth upon which to construct an artificial denture, a perfect impression is without doubt the first essential to insure success. I will explain the method I have adopted for a number of years to obtain a good impression.

Upon a rough model obtained from a wax or other impression a plate of pink gutta-percha is molded. This gives me an approximative plate. I next bend a piece of moderately stiff iron wire in form to cover the alveolar ridge. This wire being heated, is pressed or imbedded into the gutta-percha, and when cooled gives stability to the plate.

Taking a superior plate so prepared, I warm the edges over a spirit-lamp, and while warm introduce it into the patient's mouth, holding it in place with the index finger, firmly pressed in the center of the hard palate. While in this position I distend the buccinator muscles

on either side by inserting the finger of my free hand between the plate and the muscles, pushing them slightly outwards. Running the finger back to the tuberosities, I mould the gutta-percha over them, and if the finger will not reach I use the flat handle of some instrument. Take the lip at its median line between the thumb and fore finger and draw it gently downwards and slightly outwards, and this will leave the impression of the *frænum labii*. Remove the plate and cut off any excess of gutta-percha. Again warm and insert, holding in place as before, instructing the patient to open the mouth to its utmost capacity, contracting and relaxing the muscles alternately. This done, remove the plate and plunge in cold water for a few minutes; dry and again pass the whole internal surface of the plate quickly over the flame, making it soft enough to receive a nap of absorbent cotton. Pull off surplus cotton and immerse in cold water until hard. Coat with thin plaster, and return it to the mouth, holding it in place as before with the index finger, and instruct the patient not to move the muscles. The plate should not extend at its center beyond the transverse suture of the palate process. It will sometimes occur that the membrane covering the posterior palate grooves will be found to be very puffy or flaccid, partaking in a measure of all the motions of the soft palate. If a denture is made on a model which represents this region when at rest, the rigid plate will allow the air to pass under on both sides at each deglutition. The remedy for this is to scrape a little from the model in the region of the flaccidity. Again, if a hard prominence occurs over the longitudinal suture, the thin shell of plaster removed from the mould where the suture is represented will remedy the defect of a riding plate. In taking impressions of the lower jaw, I proceed as before with the gutta-percha plate, but as obstacles present themselves of a different character to that of the upper, I will describe them. The lower jaw deprived of the greater portion of its alveoli presents two ridges, one the external oblique, and the other the mylohyoid, which is internal, both of which form a boundary line over which a plate should never pass. The external oblique ridge gives attachment to the depressor muscles of the angles of the mouth and lips, while the internal mylohyoid ridge gives attachment to the mylohyoid muscles from the symphysis in front to the last molar behind, and forms the floor of the cavity of the mouth. When the tongue is thrust forward or elevated to the palate, it is done by the action of the genio-hyoglossus, which arises from the superior genial tubercle, forming the *frænum lingualis* by its

attachment. In this action of the tongue the whole floor of the cavity of the mouth is more or less raised forward.

It is clear that in taking impressions of the lower jaw this action of the tongue should be repeated so that the future plate to be worn will not interfere with the free action of the muscles. The inferior attachment of the buccinator and the *frænum labii inferioris* must receive the same attention as the superior. There are a few little external muscles that control the action of the lips, which should be exercised while taking impressions. I refer to the levators and depressors. The attachments, although much lower down on the alveoli than the buccinators, are nevertheless liable to be irritated if the lower border of the plate is permitted to reach the points of their attachments. *The loss of the teeth in either the upper or lower jaw, and the consequent absorption of their alveoli, destroys the attachments of the buccinators and renders these muscles useless. This is also the case either in whole or in part, with the depressor and levator muscles when absorption of the alveoli becomes complete.*

When the alveoli of the superior maxillary become completely absorbed, it presents two hard lateral external prominences at the site of the (lost) first molars, and a deep, flaccid depression immediately behind and between the prominences and the tuberosities. These prominences are the malar processes of the superior maxillaries. I have always found it necessary to remove a portion from the surface of the impression of these prominences or raise the prominences in the model; at the same time scraping a little from the model in the region of the deep flaccid depressions. If this precaution is taken, the plate will not rock on the malar processes. When the alveoli of the inferior maxillary become completely absorbed, the region of the molars and bicuspids does not present a prominent ridge; on the contrary, a depression between the external oblique ridge and the internal mylohyoid ridge. Commencing with the first bicuspids and extending forward to the lateral incisors, a more or less sharp ridge is observed, which sinks into a depression or flat surface at the site of the central incisors, and is broad from the anterior to the posterior. This is owing to the attachment of the genio-hyoglossus muscle to the superior genial tubercle. Now, the detached buccinators and the flexible mylohyoid muscles form folds which cover the posterior depression of the bone surface, while the genio-hyoglossus hangs over the anterior depression on the flat surface at the median line.

In constructing a denture for such a case the plate cannot extend be-

yond or below the lateral ridges external or internal; nor can it extend below or beyond the flat or depressed surface at the median line from the anterior to the posterior, without impinging on the free action of the muscles. The plate, however, can be so constructed that the fleshy folds of the detached buccinator and mylohyoides will rest on its outer and inner borders, forming folds over, rather than under, or forcing them from the plate; and the same is true at the median line. In other words, never make a lower denture broader at the base than the lost alveoli. There are two points, however, where the inner border of a lower denture may pass down a little with safety and some advantage below the horizontal surface. At the site of the right and left cuspids (internally) there is a fossa for the reception of the sublingual glands, and, as there are no muscular attachments at these points above the glands, the plate can lap over and press these glands inwards a little without causing much disturbance.

Dr. Black. There is one point I should like to have some one investigate thoroughly. It is this question of *sore mouth under plates.* It has been before us ever since the introduction of vulcanite, and has been under discussion for twenty years seemingly without a step in advance. Several years ago I made some observations with a view to gain more knowledge of this disease, but have been unable to follow them up fully since.

The cause of the disease has been ascribed to the coloring matters of the red-rubber plate, and so black rubber, porcelain, metal, and other substances have been substituted. But in many cases this sore mouth may occur under metal, and sometimes even under the porcelain plate. These observations led me to think that this difficulty did not result from any poisonous material in the base, for these diseased conditions occuring under different plates are evidently identical. After the last meeting of this society I took this subject up, intending to make it my special work during the summer, but I was forced to abandon it after making the few observations which I now detail.

A word or so, first, in regard to a claim that has been made, viz., that the vapors from amalgam fillings and red-rubber plates are poisonous to insects. This is not true, for micro-organisms can be grown over mercury or amalgam fillings under a bell-jar, and they multiply prolifically under rubber plates. My attention was called to this organism by stripping off a papilla from the spongy tissue which is found under the palate in this diseased condition, transferring it immediately to a warm slide and examining it under the

microscope. Very large living leucocytes were seen with little chaplets of bacteria hanging out of them. These can readily be seen with a half-inch objective. A continual warfare is carried on between the leucocytes and micro-organisms. One of the offices of the leucocyte is to pick up anything that it comes in contact with in the tissues, such as red-blood disks, coloring matters, micro-organisms, or other extraneous matter, and it is often a question which will conquer (digest) the other. Last fall Dr. Prince sent a patient to me with a filliform pterygium which was very strange in appearance. The similarity between its processes and those found growing under a plate in "sore mouth" was so marked that I clipped one off, and, examining it under the microscope, found the condition of the tissue very similar, including the micro-organisms. I do not think this disease is caused by specific organisms, for I have often found the organisms of putrefaction in those tissues, and if we will eliminate the peculiar conditions which cause the trouble the tissues will throw off the organism. (The "peculiar conditions" consist of an unnatural covering of the tissues of the mouth and *filthiness.*) Scrupulously *clean* rubber plates will cure the disease, and unclean *porcelain* plates will produce it.

Practical observations teach that these organisms cannot under ordinary circumstances invade the tissues, but under the peculiar conditions which result from wearing a plate, which affords protection and prevents radiation of heat, together with filthiness, the organisms thrive.

Dr. W. A. Stevens. Have you ever found free mercury in the tissues in these cases? I have heard of globules of mercury being squeezed out of diseased gums.

Dr. Black. No, sir. It has been noted that a change to black rubber is beneficial. I have also noticed that a change from black to red rubber is likewise beneficial.

Dr. Swain. Do you, then, consider the coloring matters of vegetable bases deleterious?

Dr. Black. I do not.

Dr. Swain. As bearing on this point, I would like to report a case which came under my care recently. A lady had all of her remaining teeth removed and a complete denture on rubber inserted. A few days after the extraction, after having worn the plates for about two weeks, the patient returned, her handkerchief to her mouth, with as complete a case of ptyalism as I ever saw. To satisfy myself that the plates were the cause of the trouble, I had

them removed for a time, and found that the ptyalism ceased. As a further test, they were again placed in the mouth and the same condition returned.

Aluminum plates were substituted for the vulcanite, and the mouth was restored to health, and has remained in that condition ever since. Now, this case was one of mercurial ptyalism, due to the the coloring matter of the plate, in my judgement, and not a case of copious flow of saliva from irritation. But it must be remembered that some people are very susceptible to the presence of mercury.

Dr. Black. Those peculiar susceptibilities are very rare. A physician came to my office with a set of symptoms which indicated plainly an ugly case of paralysis. When I so informed him he laughingly told me that he had spilled an ounce of carbolic acid on his hand the morning before, and that this drug always manifested its toxic effects on him in this manner. This was his peculiar susceptibility.

Dr. Newkirk. What would be the difference in the temperature of the parts under a vegetable as compared with a metallic base?

Dr. Black. The difference would be very slight if the mouth were closed continuously; only when the mouth is opened would the temperature under the metallic plate be slightly reduced.

Dr. Salomon. Much has been said about micro-organisms. Are they found in the air-chamber, or all over the under surface of the plate? I should think that there might be less of them when no air-chamber is used, even in metallic plates.

Dr. Black. My reply would be that we find micro-organisms in every part of the mouth, where they are not disturbed by the saliva or movements of the mouth. A poor-fitting plate affords them good protection.

Dr. Prichett suggested that by leaving the plates out at night this condition might be modified, and in many cases prevented.

Dr. Cormany. How do you account for a case of salivation which is produced by wearing a rubber plate fifteen minutes?

Dr. Swain. Such a case would result from the local irritation.

Dr. Taylor. I understand the case related by Dr. Swain to be a *pathological* condition, and Dr. Cormany's, where ptyalism occurred in a few minutes, to be a *physiological* process.

Dr. C. W. Spalding, St. Louis. Salivation may be produced in five minutes, or, as in Dr. Swain's case, in two weeks. The sight of food may cause salivation, or it may be produced by medicines in a very short time. The process is that of nervous excitation by

reflex action. Pathological processes do not differ from physiological processes, except in degree.

Dr. Black. Will you name a physiological process identical with ulceration?

Dr. Spalding. The cases are not parallel; ulceration is a destructive process, a death process, and does not come within the range of physiology.

Dr. Noyes. We should not lose sight of the main point in Dr. Black's remarks, which is that extreme cleanliness is the chief and most available means for protecting the mouth from the injurious effects of wearing artificial plates of any material. I believe that most of the differences observed in the relative healthfulness of mouths under gold and rubber plates are due to the smoother surface and more perfect cleansing of the former. The palate side of a plate ought always to be finished smooth, so that it *can* be well cleansed, and patients should be carefully instructed as to the importance of doing so. Prepared chalk, soap and water, applied with a brush, and the occasional use of an antiseptic will prove very efficacious in cleansing plates.

Dr. Black. Let me add one more word. I would like to suggest that every dentist having a microscope (and I hope each has one) take some of this viscid mucus from the mucous membrane, and spread it in a very thin film on a glass slide (use some of the patient's saliva to mix it with if you cannot spread it without); then warm it gently over a lamp, just enough to dry it. Then add a strong alcoholic solution of fuchsin; let this dry slowly, but add more just before it is dry—several times. After half an hour wash it by dropping alcohol upon it from a tube, drop by drop, until the color is almost all removed. Now, an examination will show that nearly the whole mass is composed of micro-organisms.

Dr. Sitherwood. I would like to call attention to the fact that Dr. Swain used aluminum for a base in the case cited, and with good results. It has the advantage of being easily kept clean, and I think it is the coming cheap base. The French, I notice, seem to be ahead of us in the use of this metal.

Dr. Call. A year ago the Buffalo Dental Manufacturing Co. furnished me with a pound of aluminum which I required for other purposes, and I found it of a much superior quality to any before obtained for plates. If we could always procure a good quality of aluminum, it would prove very satisfactory as a base.

Dr. Allport. I was gratified with the paper by Dr. Davis, no less

than with the opening remarks in the discussion by Dr. Swain, but I was particularly well pleased with the remarks of Dr. Patrick in regard to the taking of impressions and the fitting of plates. The importance of the greatest accuracy in these first steps in the construction of a set of artificial teeth cannot be overestimated, for upon them rests the foundation of the measure of success in making the structure practically useful; and if all the details described by Dr. Patrick in those two first steps be fully carried out, I cannot well see how greater perfection can be attained in this direction. It is to be hoped that all who listened to him will be stimulated to the intelligent nicety of detail which he has recommended. But as deeply as I was interested in the paper and discussion of the subject, I was sorry not to have heard more in regard to the artistic part of prosthetic dentistry, which should aim to make such a selection and arrangement of artificial teeth that they will conform so perfectly in color, size, and shape to the mouth and facial expression as to conceal the fact of their being artificial.

Our manufacturers of artificial teeth have so faithfully copied nature, and have given us such an endless variety from which to choose, that the lack of artistic adaptation to individual physiognomy which we so frequently encounter in artificial dentures cannot so much be attributed to want of proper material at our disposal as to our unpardonable lack of artistic knowledge, which can only be remedied by adequate education in such departments of art as drawing, sculpture, and color-harmony. Drawing and sculpture would give the necessary ideas of form and proportion; while in the department of color the student would learn how to blend shades and use them in harmonious combination with the facial tone of the individual wearing the substitutes. The prosthetic dentist who would excel in the artistic department of his calling must possess the same faculty of discrimination in color and form which is required to make the successful sculptor or painter. With a proper education in this respect, which can only be acquired by study of the subjects named, accompanied by the artistic feeling so essential to all true art, the least comprehended and most neglected part of prosthetic dentistry would be greatly enhanced and placed upon its rightful basis. May I not venture to suggest, therefore, to the committee having the matter in charge that they will make such a selection of the essayist upon prosthetic dentistry next year as will give us something which will tend to educate and improve us in this direction.

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Dr. Wilson, of Burlington. I was much pleased with Dr. Black's observations on the evil results from wearing red-rubber plates. About fifteen years ago I was about to abandon the use of this material for a base on this account, when I discovered the same symptoms occurring under a gold plate. It was noticed, however, that in no instance did this trouble appear when the patient was in the habit of leaving the plate out over night, and also that the plate was found filthy whenever the abnormal condition presented.

The speaker thought that, a plate being worn constantly day and night, the pores of the mouth become closed, making it impossible for the mucous membrane to properly perform its functions. With the plate kept clean and removed over night, this sore mouth will rarely occur.

[Discussion closed.]

NERVOUS MATTER AND PRINCIPLES OF NERVOUS ACTION.

BY DR. GARRETT NEWKIRK OF CHICAGO.

In the material world around us the forces are the physical and the chemical. In the vegetable there is superadded the mysterious force we denominate vital. In animal life alone do we find the nervous.

The distinctive feature of the animal kingdom, from the lowest to the highest forms, from the simplest to the most complex, is the possession of nervous matter, either in visible structure or as a property of protoplasmic fluid.

In man we have the same physical, chemical, and vegetative forces that exist in external nature, but in a sense these are all subordinated to the energies resident in his mass of nervous tissue.

The first step in the division of nervous tissue is into the gray and the white. These two are intimately associated and correlated. They lie side by side in brain, and cord, and ganglion. There is no abrupt line dividing them. They are, as it were, interlaced. The gray tint is not suddenly but gradually effaced in the meshes of the white. Of the two, the gray matter is the more homogeneous—more distinctively cellular in structure. The white tends to parallelism

of arrangement more and more as it recedes from the gray till it completes its purpose in the formation and distribution of nerves. The white is the firmer of the two, not so much by inherent difference of constitution, but rather by the addition of interstitial layers of fibrous connective-tissue. Consequently we find the gray matter so placed as to receive the best possible protection from external causes of injury. In the cord it is inclosed and protected by the white, and both are guarded from injury by a most ingenious arrangement of the bones that form the spinal canal—an arrangement which permits a certain amount of motion without danger to the great nerve trunk. Within the skull this order is reversed. The gray matter is on the outside—spread out, so to speak, on the surfaces of the convolutions, and lies just within the cranial walls. But it is well protected from shocks.

First, the skull is double-plated, the two plates being in places somewhat separated by spongy bone.

Secondly, three distinct membranes lie between the skull and the gray matter, forming together a protective cushion.

Again, the arrangement of the folds or convolutions is such as to permit a degree of lateral movement of the folds themselves, valuable as against the shock of external violence.

This arrangement of the gray matter on the surface and in folds allows the placing of the greatest amount with the least thickness at any given point; and if an organism so jelly-like were otherwise arranged, it would be in danger of breaking down by its own weight, or the weight of other matter, or from jars, shocks, or congestion.

We may say of the gray matter that it is the center of animal life and action. So far as we know, there is no form of life where the white exists without the gray, or some form of protoplasm which represents it. And the white is servant to the gray,—subordinate both in motion and sensation.

Regarding the structure of gray matter, it is sufficient for our purpose here to say that it is little more than an aggregation of nerve-cells, with just sufficient connective nerve-tissue to hold it in form.

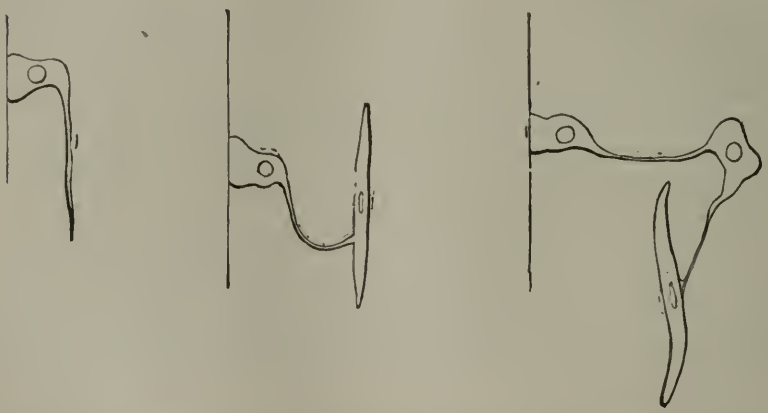
But as we know the constitution of the ocean by the analysis of a single drop of water, so we may understand quite well the character of nervous matter in mass when we have learned the structure and habits of a single cell, or a series of connected cells.

We have in Fig. A a simple sensitive nerve-cell, with a motor

appendage, as found in some of the lower forms of animal life. In Fig. B a higher form is represented, where the sensitive cell is connected by a nerve to a muscular cell. Fig. C illustrates another advance in organization; a sensitive cell connected by a sensitive nerve to a central cell, which in turn communicates by a motor nerve with the muscular cell.

This last is the triple alliance—the triangular base of the higher order of nerve-structure. Given an understanding of this simple series, and you have the underlying principles of all nervous action. Multiply first the sensitive cells into millions of such cells. Let these be distributed through all the tissues of the body, but chiefly on the surfaces, internal and external. Each cell is to take cogni-

Fig. A. Fig. B. Fig. C.



zance of whatever comes in contact with itself. It is an intelligence officer to the central cell.

By the term sensitive we mean all cells which receive impressions from without and transmit to the center, and this whether the mind be conscious of the impression or not—whether the center be the brain or cord, or a simple ganglion.

The sensitive cells perform a vast amount of work dis-sociated from mental consciousness. The mind is not troubled by the ordinary and healthy processes of organic life. These are under the control and supervision of the lower ganglia, with which the sensitive cells of the heart, lungs, and other vital organs communicate. In fact, the sensitive cells take cognizance of many things of which the mind cannot be cognizant—insensible properties, such as exist in deadly poisons. The sensitive cells are the sentinels on guard at

every outpost; they preserve every interest in every tissue. By this intelligence nutrition is regulated and supply made equal to the demands of waste; upon their information glands secrete in due amount, and the circulation is hastened or retarded.

But we must let our minds be plainly impressed with one distinctive fact as to the sensitive cell. It does not originate anything, so to speak. It is simply an informer. It is not a governing cell. It is a news reporter, but not an editor. Its only connection with the central office is by wire, and its business is to send messages but never to receive any.

Each sensitive cell has its own wire; so we assume, although it cannot be demonstrated but that a small group may use the same line—namely, a filament, a nerve fibrilla, a part of the so-called sensitive nerve. This wire transmits but one way. The sending office is always at the same end, the peripheral; the receiving is the central cell. The central is a cell of gray matter either in ganglion, cord, or brain. The gray matter would seem to be the seat of independent power. It sets in motion. It develops energy. It has a will of its own. It sits as a ruler and a governor.

Now, the whole mass of gray matter of the great cerebro-spinal ganglia is simply an aggregation—a myriad multiplication of the central cell.

We have seen that the sensitive cell has but one office and relation to the system, viz., to transmit messages from periphery to center.

In its simplest office the central cell has at least a double relation. First, it receives the impulse sent by the sensitive cell. Second, an amount of energy is at once developed according to the impulse received, and manifested without hesitation in the direction indicated.

A finger of the hand is pricked by a needle. The central cells are almost simultaneously informed; a sufficient energy is induced to withdraw the hand. The time taken for it all is quite infinitesimal, but there is no mistake made between hands or a hand and foot. The nerve fibrilla by which the message goes to the muscle to withdraw the hand differs in no wise, so far as we can see, from the fibrilla which carried the message of information. They seem to be but simple wires. But they do not lie in contact. A bundle of one kind is laid together inclosed by a common sheath, and when we see it we call it a sensitive nerve; a bundle of the other kind we say is a motor nerve, because we have learned by experiments what offices are performed by each.

So far as we know, the peripheral or sensitive cells do not associate so as to pass impressions from one to another, although a great multitude may be simultaneously affected by the same cause. Thickly distributed as they are, they are distinct. They are distributed in and upon other tissues.

But the central cells exist in mass. The gray matter contains barely enough connective-tissue to form a skeleton and supply blood. The central cells, therefore, are not only intimately connected with the sensitive cells by the sensitive nerves, and contractile tissue by the motor nerves, but also with each other.

So the cell, receiving an impulse from the periphery, may associate with itself a thousand cells of equal power, and, multiplying the force a thousand times, send it on the instant by as many motor fibrils to produce contraction.

The change in the muscle cells is a measure only of the change in the central cells.

Common substitutes for the words *sensitive* and *motor* are the terms *afferent* and *efferent*, meaning to convey in and out. So the central cells are said to convert afferent into efferent impulses, or sensation into motion.

Having seen how a slight afferent impulse may be multipled by the central cells into a manifestation of force greatly disproportionate (as, for example, in a case of convulsion from slight peripheral irritation), it is evident there must be some means of limiting such extreme action; otherwise there would be continually, as there is occasionally, in abnormal conditions, great waste of energy.

So there are, first, limitations of anatomy, so to speak. The cord and brain are in segments or divisions, each division being set over special parts and functions. The dividing lines may not be traced, but there is no doubt of the fact of their existence. Therefore, an afferent impulse sooner or later reaches a point beyond which it may not readily go.

Secondly, there are certain tracts, so it is believed, the office of which is inhibitory. That is, it is their business to "put on brakes." We know there are such tracts of matter in the brain, because, by stimulating certain nerves that proceed from these parts, we can slow the action of the heart and lungs. Medicines like veratrum viride and digitalis act upon certain central cells, and through them by fibers of the pneumogastric and spinal-accessory nerves. Stimulation of these fibers inhibits heart action,—reduces the number of beats per minute.

When we speak of a nerve, the idea in our mind is ordinarily that of unity. We think of the nerve as one thing. But let us examine for a moment one of these, say a spinal nerve.

A spinal nerve consists of two nerves. These have entirely different offices. They go together merely for the sake of convenience,—first, in getting out of the bony canal in which the cord lies, and, second, convenience of distribution. But we call the two together a nerve. Let us say, for illustration, it is a rope of two strands. These strands are made of threads, and the threads are bundles of fibres or filaments. We can see the rope, the two strands before they join, or we can separate the coarser threads so that they may be seen with the naked eye, but the filaments only with the microscope. Unlike the strands and threads of a rope, however, the parts of the nerve are not twisted upon each other, but lie parallel, inclosed by a common sheath.

The diameter of the fibrilla varies from the $\frac{1}{1000}$ to $\frac{1}{10000}$ of an inch. Supposing the average to be $\frac{1}{5000}$, and multiplying this into itself, we have 25,000,000 as the possible number in a cord containing the equivalent of a square inch.

If Chicago were connected with the outside world by a like number of telegraph wires, these wires, laid as closely as possible, would fill four of the principal streets fifty feet deep. Allowing forty wires to each person, it would require the services of every man, woman, and child in the city to operate them.

But the aggregate of the diameters of the nervous trunks of the body would be not one but several inches.

The two strands of the rope—the spinal nerve—are to all appearances and analysis alike, yet they convey energy only in opposite directions. One (the posterior) is the afferent wire, conveying impressions from without inward. The other is the efferent wire, conveying motive force from the central cells to parts without.

These lines, as electricians say, complete a circuit. Suppose, for example, a needle-point enters my finger. The sensitive impulse goes by the fibers of the afferent strand to the central cells in the spinal cord. From the central cells a motor impulse is returned by the efferent branch to the arm, hand, and finger, to withdraw from the offending body. The point of departure of the sensitive impulse is the terminal point of motor energy, and the circuit is complete. It is possible, too, that the hand may be withdrawn as soon as or even before I am conscious of pain. How is this?

It is thought that only the cranial nerves have an immediate,

direct connection with the brain; that sensations going by way of the cord advance by relays, as it were. That is, the sensitive dispatch is first received by the central cells in the gray matter of the cord, and by these re-transmitted along the lateral or posterior columns to the centers of consciousness. But while the re-transmitted message is going upward, the motor impulse has already gone outward to withdraw the member. By thus taking the matter in hand, the spinal cells save time, and even the thousandth part of a second is valuable where a hand is in the fire. If deliverance always had to wait for the longer circuit of consciousness and will, the amount of injury might be greatly increased.

Co-ordination of Voluntary Muscular Movement.

This is certainly one, if not the only, office of the gray matter of the cerebellum.

This co-ordination is one of the most wonderful results of life which our eyes behold. It begins to be manifested before birth. Then, as we watch the movements of an infant newly born, we observe that while these are weak and awkward, there is something of regularity and correspondence, showing that the organs have taken their first lessons. Day after day witnesses an increase of nervous rhythm and muscular agreement. As the child grows the co-ordinating powers are educated. When he first wills to walk, he falls. It is only after many trials and repeated failures that he is able to maintain a position of equilibrium above his feet.

Think what a difference there is between such manifestations and those of the acrobat or bare-back rider in Barnum's circus. What a difference even between the movements of the ordinary pedestrian and the first attempts of his babyhood.

Listen to the ceaseless tread of the great human army marching to and fro upon our streets; watch the daily panorama of complex activities that moves before your eyes. Stand and wonder and admire the strength and the precision, the grace and the beauty of movement, that join and flow together from the fountains of co-ordination!

But the chief glory of the human organism is not found till we climb beyond nerve and cord, medulla and cerebellum, to the gray matter of the cerebral convolutions. Here dwells the king. Here in this mysterious chamber are wrought the still but mighty works of intellect, affection, and will.

Other animals may be immeasurably superior to man in bone and muscle, equal or superior in certain co-ordinations; may have finer

organs of special sense; but in the one thing of cerebral gray matter, the organ of thought and reverence and benevolence and will, he stands alone upon the earth, having "dominion over all."

Underlying Principles of Manifestations of Nervous Energy.

I presume we have all of us often asked ourselves, What is the underlying principle of this transmission of nervous energy, motion, or sensation? What is it that travels along the nerve? Does anything really travel? We have heard of ethereal fluid, nervous fluid, electrical fluid,—an intangible, indefinable something supposed to whirl along the nervous lines like a cash-ball on the track in a modern retail store. Is there any such thing? I take it that all these operations proceed on the principle of contact. It is entirely a matter of touch.

The sensitive cell is simply the ultimate cell exteriorly of a series of cells. It is the extreme end of a nerve-filament. The first cell being touched, touches the second, the second the third, the third the fourth, and so on till the central cell is reached. What matters it that all is done in an inconceivably short space of time? It is touch, vibration, modified tension,—as you please to name it.

Suppose you could have a man stand out before you, and then, by a word, annihilate or throw off absolutely everything of him except his nervous system. What would he look like? Why, the form of the whole man would be there, less hair and nails. He would be a very nervous man, to be sure, but he would demonstrate most clearly the perfect diffusion yet unity of nerve-tissue. You might be able to see that the nerve-filaments are but fingers, millions of microscopic fingers, reaching out to touch the things in which the brain and cord have an interest. Touch the periphery anywhere, and you touch the center. It is all on the principle of contact of atoms and the *communion of matter*.

Our knowledge of the telephone may perhaps be made to assist in making the idea more clear to our minds. The construction of the telephone is simply this: Two vibratory membranes are connected by a wire. So we have in contact—air, membrane, wire, membrane, air. The man at one end sets the air in motion, producing sounds with his vocal organs, varying in intensity and number so as to constitute what we call speech. The man touches the air, the air the membrane, the membrane the wire, the wire the membrane, and this again the air; and the air touches the other man,—his ear. So by these media the two men touch each other. The

one makes impression upon the other by certain nicely adjusted movements which he has been educated to make. The other understands the movements because he has been similarly educated both to make and to perceive. It is a mode of motion.

Again, here are two telegraph operators,—one in Chicago, the other in New York. A wire connects their offices and certain cups or jars. In these jars are certain chemicals which produce atomic disturbances of a definite sort. The communication of this disturbance to the atoms of the wire is under the control of the operator. He can continue or break it at will by means of his finger on a key or button. By training, he has learned to break with varying intervals,—short breaks, long breaks, combination of breaks, so as to make an alphabet and spell words. In so doing he is playing on all the atoms of the wire, and by them the breaks or sounds are registered or reproduced at the other end, and understood by the other man. Now, the man may do all this without understanding the process at all, aside from certain mechanical executions, just as men have been talking for ages without knowing they had vocal cords. But you see that the telegraph, as well as the telephone, is simply a practical use of one of the modes of motion, and an adaptation of the principle that atoms everywhere touch.

The world is under tremendous pressure. There is tension everywhere. Every object in some way, directly or indirectly, touches every other object. But by the isolation of certain lines of atoms, as in the telephone and telegraph wires, we are able to control and utilize the *sensitiveness of matter* in a definite way, and for a definite purpose.

So our nerves are merely isolated lines of atoms. The terminal sensitive cell touches the central, and the central in turn touches the lines of atoms that provoke contractile energy. And so we have sensation; and so we have motion.

Discussion.

[Opened by Dr. Homer Judd.]

Dr. Judd. I respond to the call to open the discussion upon this subject, not because I am anxious to speak upon the various questions which may arise during the progress of the discussion, nor because I deem myself capable of interesting or instructing the members of the society upon this subject, but simply because my name was on the program in this connection, making it my duty to say something upon this subject. The histological description given in the paper

to which we have just listened of the gray substance of the brain, whilst showing that these delicate tissues are carefully guarded against external injury, might perhaps have been extended a little further by stating that there also exists a gray gelatinous substance in which the cells are imbedded, and which fills the interstices between the connective-tissue fibers.

This gelatinous stroma gives additional protection to these delicate cells, and furnishes additional evidence of their importance in the animal economy. But it has been intimated that these cellular elements of the gray substance of the brain were the generators of thought. Now, thoughts are potent factors in the economy of the universe, and are manifested through the exercise of mental functions, and therefore related, so far as origin is concerned, more closely to our psychical than to our physical nature. In fact, it may be that the Brahminic creed, which has been denominated by an able divine of the present day "a stupendous system of human thought," is right when it teaches that the soul of man is a direct emanation from the divine fire to which it finally returns, so that we may consider thoughts, viewed in this light, as in reality creatures of the universal Creator.

Dr. Spalding. We cannot intelligently discuss the origin of the physiological forces without entering the domain of psychology, and hence this discussion naturally and necessarily runs in that direction. I know, Mr. President, that the sentiment I am about to express is at variance with the views put forth by the prominent scientific men of the day, yet that is no reason why I should refrain from giving it utterance. So far as I know the most eminent authors who have written upon the subject have endeavored to account for physiological phenomena upon purely physical principles. They have endeavored to show (vainly, I think) that physical forces are alone concerned in the production of physiological processes, although all, I believe, admit that mental causes modify certain of the phenomena resulting from these processes. That physical forces are concerned in these processes no one can deny, but they act as agents, and not as causes. The motions of the brain that attend mental processes have an origin above that which constitutes any of the physical forces. Thought does not originate from the action of any force that is merely physical. There is no possible chemical combination, nor any possible arrangement, of the physical forces that can give rise to a single thought. Thoughts often come unbidden and unsought; they are forced upon us, as it were, and cannot be

accounted for by any molecular changes in the gray substance of the brain, however subtle these may be. This is so for the reason that this world is not a world of causes, but a world of effects. Causes are superior to all physical results, and have their origin in the supernal.

I cannot occupy the time of this association in the discussion of the points now alluded to, as it would not be germane to the general object in view, and I will only add that this world of causes—this spiritual world—is constantly as near to our spirits as the material world is to our bodies, and that each affords the requisite elements of nutrition and sustenance appropriate to their respective spheres.

Dr. Patrick. The paper, so far as I understood it, was simply a study of gray matter treated in a strictly scientific manner; and while I do not think it is desirable that inferences of a theologic character should be drawn from a paper read before this body, I cannot see any impropriety in their being discussed when once permitted to be introduced; for the human mind must be left unrestrained in dealing with questions before a scientific body. Questions of a scientific characters in the strictest sense, belong to the academy; whereas, questions of a theologic or religious nature belong to the temple, and the experience of ages teaches that both thrive better when kept separate.

Dr. Taylor. How do we explain a pathological reflex action in a case where the pain from a diseased lower tooth is reflected to the upper jaw or elsewhere?

Dr. Judd. The question as to whether the gray matter of the brain originates thoughts or not is purely a physiological question, and is one which is very properly discussed in this society. If in the discussion of this question we impinge upon the domain of psychology, it is because these gray corpuscles of the brain seem to stand upon the limits of the two worlds. Impressions from without are transmitted to them through nerve filaments which result in certain changes, and impressions reach them from the mind which produce changes with certain results in both cases, so that it seems as if here was the very door through which communication was established between mind and matter. These considerations enhance to a very great extent the interest which attaches to the study of this portion of the nervous system.

Dr. Newkirk. My paper was merely an attempt to present something like an epitome of the subject, from a physiological stand-point. I am not sure that I am capable of properly answering Dr. Taylor's

question. I explained in the paper that by central-cell contact we may have the transmission of greatly multiplied energy; so, if cells be in a pathological condition, it is easy to imagine how impressions going to the wrong point may give rise to misdirected energy.

Dr. Morrison suggested the crossing of telephone wires as an illustration of how this might happen.

Dr. Black. Thought is a function of the vital force in gray matter, and this is as far as we can trace that phenomenon. Now, as to misplaced pain, there is not, perhaps, a more interesting subject than this reference of pain to another part. Let us examine the sensory function for a moment. I have power with the hand to recognize a smooth surface, heat, cold, etc. The retina is sensitive to certain forms of motion which we call light, the inner ear to a different form of motion, and so on. Did anyone ever know a reflected pain where the sense of touch was implicated? Sense of touch is the great localizer. It is the only sense of localization the nervous system possesses. The dental pulp has no sense of touch; neither has the liver,—its pain is manifested at a point under the shoulder. The pain of iritis is felt in the brow; of hip-joint disease in the knee. An Irish woman had cured pain in an upper tooth repeatedly in which I found no decay, but three days after I had extracted an affected lower tooth she coincided in my diagnosis.

Dr. Newkirk asked: Can pulp-tissue be educated to possess the sense of touch?

Dr. Black. No, sir. How can the pulp communicate the sense of touch when it contains no nerves of sensation? The peridental membrane has a very delicate sense of pain—touching pain. The speaker then related an experiment performed by Darwin in the Zoological Gardens while studying the subject of reflex action. His face being placed against a plate-glass case containing serpents, he was unable to resist the reflex action which caused him to start back when one would strike at the glass.

Dr. Rohland. Do we ever have reflected pain arising from the peridental membrane?

Dr. Black. Never. We may have a radiation of pain in connection with pain at the diseased point, but not true reflex pain.

Dr. Fitch. Is not reflex action what Carpenter calls unconscious cerebration?

Dr. Black. Reflex action does not reach so far as the brain. The center is in a ganglion.

Dr. Nelson. I do not agree with the last speaker that impressions

are not carried to the brain. I believe that the impulse goes to the center, but that it is so rapid that the mind takes no cognizance of it.

ERRORS IN PRACTICE NOT ALWAYS DISADVANTAGEOUS.

BY DR. JOHN J. R. PATRICK OF BELLEVILLE, ILL.

The accidental circumstances which frequently bring medical men into extensive practice, or that notoriety which may eventually lead to it, are truly peculiar and sometimes very instructive. It is stated on good authority that a most eminent English physician owed the commencement of a successful career in his profession to his having been in a state of intoxication when he received his first call. Disappointed on his first arrival in London, he sought comfort in a neighboring tavern, where his servant went to fetch him one evening, after a heavy potation, to see a certain countess.

The high-sounding title of this unexpected patient tended not a little to increase the excitement under which he labored. He followed a liveried footman as steadily as he could, and was ushered in silence into a stately mansion, where her ladyship's woman anxiously waited to conduct him most discreetly to her mistress' room; her agitation most probably preventing her from perceiving the doctor's condition. He was introduced into a splendid bed-chamber, and staggered towards the bed in which the lady lay. He went through the routine practice of pulse-feeling, etc., and proceeded to the table to write a prescription, which in all probability would have been mechanically correct. But here his powers failed him. In vain he strove to trace the characters, until, wearied in his attempts, he cast down the pen, and exclaiming, "Drunk, by heavens!" made his best way out of the house, feeling conscious that he had lost the opportunity of his life. Two days after he was not a little surprised by receiving a letter from the lady, inclosing a check for £100, and promising him the patronage of her family and friends if he would observe the strictest secrecy on the state in which he had found her. The fact simply was that the countess had been indulging in brandy and laudanum, and was herself in the very condition in which the doctor had so frankly confessed himself to be.

Among the many instances of good fortune may be mentioned that of a dentist who was called in by a physician to extract from the mouth of a lady an impacted wisdom-tooth, which had produced great nervous prostration for weeks before the cause of the malady was discovered, and when discovered had baffled the skill of the physician to dislodge. Upon the removal of the tooth the lady was almost immediately relieved from her suffering, and felt a corresponding degree of gratitude to the dentist for the dextrous manner in which he removed the obstinate member. The dentist, during the operation, observing many teeth in the lady's mouth that needed his services, pointed out the advantages that would result by attending to them at as early a date as possible.

In the course of a few weeks the lady, being entirely recovered, presented herself in the dentist's office for treatment. During the operation of filling the teeth the flow of saliva was so great that it seriously interfered with the progress of the operation (for rubber-dam, the saliva-pump, and the mallet had not been introduced at this period in the history of dentistry). Finding it almost impossible to proceed with any degree of comfort, either to himself or patient, and being a man of resources, he conceived the happy idea of stopping the flow by introducing pledgets of sponge into the orifices of the ducts of Steno. This was immediately done, and by renewing the pledgets when they slipped out he completed his work for the day, pleased with himself and feeling tranquil with the thought that he had discovered an easy method of stopping the flow of saliva during dental operations.

In less than forty-eight hours afterwards the husband of the lady called on the dentist, and informed him that his wife was in great distress, and that he feared the former malady was returning, as she had not slept during the night and was suffering great pain, with the addition of a swelled face; adding at the same time that his wife had more confidence in him than in their family physician. The dentist's heart beat with anxiety; his former cheerfulness became dashed with apprehension as he at once armed himself with a few small instruments, and accompanied the gentleman to his residence, who at once led the way to his wife's room, where she was found in a miserable condition, sitting in a chair. The anxiety depicted on the face of the dentist did not pass unobserved, and caused some disquietude in the minds of the attendants as to the gravity of the case. He, however, examined the mouth with as much composure as he was able to command, and seeing one of his

pledgets of sponge partly protruding from one of the ducts, seized it with his spring forceps and dextrously removed it, when a stream of pus followed, affording instant relief. Giving a few hasty directions as to treatment, and requesting to be called again if necessary, he hurried out of the house, glad to escape from the terrors of such a tribunal. After a few days of anxiety in regard to the condition of his patient he was somewhat relieved when the husband of the lady entered his office, radiant with smiles, and lavished his congratulations on the dentist for his great skill in surgery. The dentist declined all merit, but it was to no purpose. The gentleman forced him to accept a generous fee, more as a reward of merit than for services rendered, and, perceiving his great embarrassment, commended him for his modesty, and, further assuring him of his good will in the future, bowed himself out of the room, leaving the dentist at a loss whether to be merry or sad on so solemn an occasion.

Chance or error in treating disease in some isolated cases will sometimes be successful when science and ability have seemed to fail, giving to the successful man a reputation for skill that is poorly earned; and this will ever be the case so long as mankind worships success without considering the steps that lead to it. The following is an instance in point taken from my own records: The case was that of Mr. H., a student, twenty-one years of age, a resident of Belleville, who first came under my care on the 2d of February, 1878 (at that time fifteen years of age), when the ensuing note was taken: Has alveolar abscess proceeding from superior left central incisor, which had been previously filled by some other dentist. Desired to have it removed, which was refused. Treated and filled the root and crown with gutta-percha. During the same year filled seven teeth, including the central incisor, with gold. On the 21st of August, 1880, treated and filled the roots and crown of the superior left first bicuspid with gutta-percha. This tooth had also been previously filled by another dentist, and an alveolar abscess had formed. During this year I filled with gold twelve teeth. In the year 1882, commencing on the 25th day of August, I filled with gold ten teeth, and in the year 1883 seven, and on the 14th day of March, 1884, two teeth, making in all thirty-eight gold-fillings in one mouth in a period of seven years, not one of which had to be replaced while in my hands. It is also worthy of remark that this patient never consulted me in regard to the condition of his teeth except when they gave pain, or he suffered inconvenience from them, notwithstanding he is possessed of more than ordinary intelligence, and has

all the advantages of education and social standing. During the month of March, 1884, he consulted me in regard to a severe pain of an intermittent character which he experienced in the region of the mental foramen, and thought it was caused by the first inferior right bicuspid. I examined the tooth indicated, and finding it had one gold filling on its distal surface, and a small one in the anterior depression of the crown, I examined the record and found that it had been filled on the 27th of December, 1882, and that the fillings were somewhat superficial. As the tooth had caused him no uneasiness during the interval between the filling and the pain, a period of nearly two years, I relegated him to his physician, believing that he needed general tonics more than local treatment, and this judgment was based on the miasmatic expression of his countenance. The pain continued at intervals, until finally a pustule appeared on the gum at the site of the termination of the root of the tooth, which seemed for a time to end the trouble. Now, this tooth gave no pain on pressure; in fact, it gave no indications of inflammation or suppuration; yet I resolved to explore its internal cavity. I removed the filling from the anterior depression of the crown, and drilled slowly into the pulp-chamber, finding neither pulp nor pus, but a dry, cheesy substance, which was comparatively odorless. After the usual treatment, I filled the root so perfectly that the gutta-percha oozed out through the fistulous opening; and yet this did not stop the flow of colorless pus. On the second of May the patient returned and complained of severe continuous pain, with no intermission as before, or, if the pain partially ceased, it again returned before it entirely disappeared. It had changed in its character from an intermittent to a remittent form. The patient placed his finger accurately over the mental foramen as the source of his suffering, and was determined to have the tooth removed. I extracted the tooth under protest, and he experienced great relief. Upon examination of the tooth the extreme point of the root showed that a pathological process of absorption had been going on for some time.

Being absent from the city some seventeen days, upon my return I was sent for by the family and found the patient in a truly wretched condition. The neuralgia had assumed a remittent form, and he had suffered intense agony for several days. The physician in attendance desired me if possible to locate the cause of the disease, and called my attention to the first inferior right molar as one of the teeth mostly complained of, although all the teeth on the same side as far forward as the mental foramen appeared to contribute to the general

torture. I examined the tooth most complained of, and found that pressure in any direction produced no change of sensation. The mylohyoid and mental branches of the inferior dental are the only deep-seated nerves accessible to pressure, and these upon being pressed were not sensitive, but, on the contrary, pressure had the effect of assuaging the pain. The pulse was large, soft, and bounding, though very unresisting and slightly double (or dicrotic), which was no doubt preceded by an opposite state at the commencement of the pain. There were no tender spots or points douloureux. I refused to extract the tooth, but promised that if I saw any prospect of improving his condition by opening the pulp-cavity I would do so, and left him in charge of his physician. His condition was not much improved under treatment, although both local and general treatment were resorted to. In fact, it could hardly be expected until his general health became completely renovated. He was finally taken by a member of his family to a dentist in St. Louis, for the purpose of having the tooth removed, who, however, refused, but drilled into the pulp-cavity, whereupon he suffered such intense agony from the shock that it was some time before he recovered sufficiently to be led from the office. The neuralgia ceased as the effects of the shock passed away, and he slowly recovered. The physician paid me a high compliment by protecting himself from censure in following my judgment; the dentist who plunged the drill into the living pulp obtained all the credit, and I was left to explain. Verily, there is nothing so successful as success! The tooth under consideration was first filled on the crown temporarily with amalgam on the 2d of September, 1878. My attention was again called to it on the 10th of April, 1882, when I filled the posterior surface with a phosphate of zinc. The cavity was large but superficial, and the patient was in poor health.

In the fall of the same year he presented himself to have the tooth filled permanently. Seeing that his general condition had not improved, the temporary filling doing well, and knowing the operation would be tedious and protracted, I induced him to forego the operation until spring. On the 2d day of June, 1883, I removed the amalgam and phosphate fillings and filled the tooth permanently with gold,—a long and tedious operation. In the month of March, 1884 (a fruitful season of the year for such diseases), the neuralgic trouble commenced.

Mr. H. was two weeks old when his father died of consumption. He comes of a family in whom the neurotic tendency is strong. He

was never very robust, and it will be observed that his neuralgic troubles are embraced in the period of bodily development,—a period in which the central nervous system has not reached its fullest development, which period embraces from birth up to the twenty-fifth year. No one, I think, can look over the tables furnished by reliable authors, and fail to be struck with the preponderance of cases in which general neurotic temperament plainly existed in the patients' families.

It is my opinion that where patients are so far debilitated by nervous disease, or any disease in fact, it is not only wrong but decidedly dangerous to subject them to a shock the unspeakable agony of which might so completely depress the whole nervous system that reaction might cease, either in whole or in part, and so produce permanent injury by local or general paralysis and even death. In writing this paper it was not my intention to furnish a treatise on neuralgia. Those desirous of research in this field will find in the works of Anstie and Downing all that may be required, but on the subject of dental neuralgia the pamphlet of Dr. G. V. Black is well worthy of your attention. The only object of this paper was to show by a few remarkable cases how errors in practice are not always disadvantageous.

Discussion.

[Opened by Dr. J. N. Morrison of St. Louis.]

Dr. Morrison. The paper afforded me considerable entertainment, but I cannot recommend anyone to seek to make reputation in that way.

The speaker then referred to the case related in Dr. Patrick's essay, saying that the young man came to him, accompanied by a brother and sister, to obtain relief from a severe pain, and which he felt obliged to furnish.

A pulp-nodule was diagnosed, and I proceeded to operate. The patient was in an extremely nervous condition, acting almost like a madman. However, the pulp-chamber was approached carefully with a right-angle bur, and entered without producing pain. It was pulpless, as were also the lingual and labio-mesial canals, but the broach produced pain in the posterior canal, which was found to contain a nodule of secondary dentine, with living pulp underlying it. To the latter was made an application of arsenious acid, and the pulpless portion was dressed with creasote. The arsenious acid was removed at the end of three days, and after two or three sittings

the case was dismissed with a complete cessation of all pain. I would add that after the operation the patient was in paroxysms which resulted more from general nervous exhaustion than from any pain which was inflicted at the time. He seemed prejudiced against his last dentist, and was unwilling to return to him as I advised.

The fillings made by Dr. Patrick that I saw were excellent, which goes to show that even when our best efforts are put forth they are often unappreciated.

I will speak briefly of a case which came under my notice recently. It was an error in practice, which I think you will agree resulted quite disadvantageously. The patient was a lady, aged from twenty-seven to thirty years; her teeth had originally been irregularly bulbous-shaped; their mesial and distal surfaces being boldly knuckled, giving them the appearance somewhat of a row of beads. A dentist had cut away the approximal surfaces of these teeth so that they came in contact at their necks. Exquisite tenderness and decay of these surfaces have been the results of this error.

Dr. Patrick. It seems to me that the more this case is discussed the more complicated it becomes. We are informed that living pulp was found at the posterior wall, which posterior portion of the tooth contained a large filling. In the anterior portion of the tooth, which was neither filled nor decayed, the pulp was found dead; hence it could not have been the filling which caused the death of the pulp; and this statement involves the case in greater complexity. Nor do I believe in the theory that the formation of ossific nodules in the pulp-chamber of a tooth is productive of disturbance, for the following reasons: All teeth are developed like bones; the hardening salts in both cases are deposited in pre-formed cells or cavities, arranged in a pre-existing mold or matrix of animal matter; but they differ in the direction of the deposit, which in bone is from the center to the circumference, and in dentine from the circumference to the centre. The process of calcification in bone is *centrifugal*, in dentine *centripetal*, and the process of formation of a human tooth is by *conversion of* the pulp into dentine, and not by a *transudation from* a pre-existing pulp. Hence we find that the teeth of man, and most of the teeth of mammals, both deciduous and permanent, when in a healthy condition, and having served the purpose for which they were designed, become solid, having no internal cavity; and this is produced by the *conversion of* the pre-existing pulp into tooth-substance. It is as much the office of the pulp to be converted into

dentine in the course of time as it is for temporary cartilage to become bone. I have removed nodules of ossific matter from many teeth that had produced no disturbance until the pulp was so much exposed from decay that its removal became necessary. Further, the examination of sound teeth taken from cadavers, and extracted living teeth, will show that nodules of ossific matter occur frequently, and it is therefore very doubtful whether their presence in the pulp-chamber is productive of pathological conditions. I would like some one to inform me how to determine that a case of pain is produced by the presence of ossific nodules in the pulp-chamber.

Dr. Allport. Did you find the living pulp inflamed or very sensitive in this tooth? And was there peridental tenderness?

Dr. Morrison. It was sensitive to touch only under the nodule in the posterior canal. The pain was diffused over the whole face on the affected side; it was not localized in the tooth, nor was there any peridental tenderness. The paroxysms recurred at regular intervals.

Dr. Black. There are some points in the pathology of the tooth-pulp that have not received sufficient consideration. I have been giving these conditions especial attention. It seems to me that the condition which gives us the most trouble in the treatment of exposures is hyperemia of the pulp. In the tooth-pulp this condition is peculiar on account of the inclosure of the organ in a tight box of dentine, which limits the swelling, and gives rise to compression of the nerves. The walls of the blood-vessels are unusually thin. The nerves of the pulp are also peculiar in that they only convey painful sensations, which in normal conditions are excited only by thermal changes, and in what we know as irritable pulp this function is greatly intensified,—often to such an extent that a sudden change of two degrees in temperature will produce intense pain. A tooth extracted in this condition will, with proper preparation for microscopic examination, show great dilation of the blood-vessels,—intense hyperemia,—but generally there is no inflammation. Often we will find that red-blood corpuscles have escaped into the tissues. In a case that has been sensitive for some time, and has been subject to repeated paroxysms of pain, portions of tissue will be found packed with red-blood disks. The case cited by Dr. Patrick was evidently one of this kind. The tooth-pulp being destitute of the sensation of touch, does not locate pain; therefore the pain may be felt remote from the tooth. Such cases are liable to terminate suddenly in the death of the pulp *en masse* from infarction.

The symptoms in hyperemia and inflammation of the tooth-pulp are very similar. Increased sensitiveness to heat and cold is common to both. A condition of lingering continuous pain generally marks a condition of inflammation with suppuration. In hyperemia the pain comes on suddenly and subsides as readily.

In inflammation little abscesses are liable to occur within the pulp tissue, and cause intense pain by the pressure of accumulated pus; this is relieved by puncturing. In such cases the pulp generally dies. The inflammation may be projected through the apical foramen, and cause soreness of the tooth by involving the peridental membrane, but the pulp will generally die from the interference with its blood supply before this occurs.

Any irritation of the peripheral ends of the dentinal fibrils is liable to cause narrowing of the pulp-chamber by inducing a new formation of dentine. This is apt to occur in connection with mechanical abrasion, and the deposit is as great on the parts of the pulp-chamber toward the roots as those parts next to the abrasion, as is usually shown by a well-defined line where the secondary formation began. I have never found a pulp-chamber entirely filled with secondary dentine. It may contain a large amount of calcific matter deposited within the tissues of the pulp without special form, in the shape of pulp-nodules, or as granular matter, but is never entirely full. Dr. Swain can tell you how calcospherites and agglomerations of calcospherites can be formed artificially. This matter having been brought into the pulp, has taken these forms through the agency of chemical forces.

True dentinal tumors are occasionally found growing into the pulp attached to the wall of the chamber by a pedicle more or less broad, produced probably by irritation of the dentinal fibrils. In structure they are a very irregularly formed dentine. The pulp in the root-canal is sometimes found stiff, but can be bent like an annealed wire. When this is spread with needles so as to be examined microscopically, it will be found to be full of cylindrical calcifications, and the tissues of the pulp to have degenerated into an imperfect fibrous tissue. Forms of deposit occur that are hard to classify. I have written "What is it?" under some of my drawings. It is not dentine, not bone, not pulp-nodule, but simply a calcific mass containing some irregular markings. Occasionally a mass is found that shows some irregular bone corpuscles with straggling dentinal tubes. These merit the name "osteo-dentine."

Dr. Taylor. Can you diagnose these different conditions?

Dr. Black. Not with any certainty. It is difficult to distinguish positively between hyperemia and inflammation. Sometimes, when I have thought I was certain, microscopical examination showed that I was wrong. I do not think we can put much dependence on symptoms that have been thought to point to pulp-nodules, pulp calcification, etc. There are few cases of mechanical abrasion of large extent in which the pulp does not ultimately die.

President Townsend. Do you ever find a non-exposed suppurating pulp that is without pain?

Dr. Black. No, sir.

Dr. Crouse. Do you not find exostosis of the root in these cases?

Dr. Black. It occurs very often.

Dr. Rohland. Do hyperemic pulps resist the action of arsenious acid?

Dr. Black. I have encountered a few cases that have resisted the action of arsenious acid, but such are very rare.

There are some pathological conditions which are very difficult to obtain for microscopical study. I would be especially grateful if any who extract teeth which they know to have had exposed pulps, which have lived under cappings for a number of years, would send them to me.

I antagonized long ago the generally accepted opinion regarding the calcification of the ends of the dentinal fibrils in abraded tracts of dentine; for, by immersing the section in chloroform, the substance filling the tubules is often found to be only oil of some kind with a little débris. By staining we find micro-organisms in these positions occasionally.

Dr. Allport. There is a general impression that secondary deposits are the cause of pain, and, when dentists have diagnosed pulp-stones, they think the cause of the trouble is ascertained; but my observation leads me to question whether they have anything to do with producing such results. They are rather the sequence of the condition that produces the pain, and may be considered harmless

The cause of the formation of secondary deposits is abnormal stimulation of the pulp, be it abrasions, fractures, the presence of fillings, or other local irritation of a mild type. This stimulation excites the odontoblasts to resume, in an imperfect way, their original function of dentine formation, and as the new material is laid down at the point of irritation, the pulp becomes just so much the smaller, this process being the same as in that of the original formation of the dentine.

In interstitial calcifications—the formation of pulp-stones—the process is also very much the same; the formation of the stones being only the calcification of so much pulp-tissue, and consequently there would be no pressure upon the pulp from the stone.

Dr. Black. The same conditions that produce calcifications produce also other pathological changes in the tissues of the pulp, but not necessarily pain. If we have a long, tedious degeneration of the pulp, calcifications result. The same thing occurs in the coats of arteries, the brain, etc., from similar causes.

Dr. Spalding asked if the pain in these cases was caused by the impingement of the pulp-nodules.

Dr. Black. Sometimes sharp points of the new deposits may impinge on the tissue of the pulp and cause pain, especially if there should be hyperemia and swelling.

Dr. Nelson. When a tooth is worn down to its neck, is not the chamber invariably filled with secondary dentine?

Dr. Allport. That is simply an effort of nature to protect herself from invasion.

Dr. Swain. In the formation of calcospherites, my experiments were verifications of those of Harting, the *modus operandi* of which is as follows: To a bottle of lime-water common albumen or mucilage is added; then a stream of carbonic acid gas is passed through the solution until a white, flaky deposit is shown. Great care should be taken not to introduce the gas too fast, or the precipitates will not show the laminated structure. When these are put in acid, a new compound (calco-globulin) is formed, which is insoluble in boiling water and acids. These artificially made calcospherites, in many particulars, are identical with those deposits in the pulps of teeth commonly known as "pulp-stones."

DENTAL SPIRITUALISM.

BY DR. LOUIS OTTOFY OF CHICAGO.

The vastness of our theme hardly admits it to be as fully treated in a single paper as we should desire, because it forces the discussion of the undecided and indefinite questions of "vital force," "magnetism," "mental force," "electricity," "nervous force," the circulation of the blood, and other questions which at first seem remote to the

subject. There might be some objection to the use of the term "spiritualism" in a strictly scientific essay; and to clear away any doubt as to its propriety, and at the same time explain its meaning, I quote from Prof. Elliott Coues:

"No scientist who acknowledges the validity of the science of psychology, and no philosopher who recognizes the validity of abstract ideas, objects to the word 'mind.' I must therefore be permitted to speak of spirit, or 'soul,' if you please, as something which, like mind, is a legitimate subject of inquiry,—first, as to whether it exists or not; second, if it exists, whether it be of protoplasmic nature or not; third, if it be not that product of the aggregation of matter, what sort of a product it may be; for I consider this inquiry especially pertinent to any discussion of life. Our alternative, you know, is that all vital phenomena, all manifestations whatsoever of life, are to be counted among the accomplishments of protoplasm, or are to be otherwise accounted for.

"Much difference of opinion as to the reality of 'soul' might be reconciled if disputants could catch each other's meaning and agree upon a definition of the term. But this is very difficult, though we all know what is meant when a human soul is in mention. Many deny there to be any such thing; many waive the question, neither affirming nor denying; most ascribe a soul to man alone; some concede a soul to every atom of inorganic matter as well as organized bodies. My view defines soul as the quantity of spirit which any living being may or does possess at any time. But this requires a definition of 'spirit,' from which all conceptions of matter are not absolutely excluded. Spirit is nothing if not immaterial. Force is likewise immaterial; but I think all persons recognize a distinction between spirit and any mechanical force, such as gravitation. My mind affords no definition of spirit, if I may not call it *self-conscious force.* Self-conscious force being illimitable in time and space, and its sum being, in a word, infinite, I am unable to draw any distinction between spirit in its totality and that Universal Mind or Supreme Intelligence which we mean when we speak or think of God."

The question of the existence of forces in the human body, whose exact mode of action is not fully understood, is an open and debatable one. No one present doubts the assertion that what are known as nervous, mental and vital force are not yet entirely understood by the physiologist, psychologist or philosopher; and yet that such forces do exist, and that they form an active part in our every-day life, is not questioned. Even the most pronounced skeptics of the

present day admit that there is a something in the universe, call it by whatsoever name you choose, which is something more than human.

Whether thought and its accompanying peculiar phenomena are simply molecular changes, and take place without the presence and influence of any force outside of the simple chemical combustion of cells, is not satisfactorily established. Indeed, that the circulation of the blood is by no means fully explained by physiologists, is equally true. Thus, it seems that some functions which take place within our body are not to be explained by either the advanced position of chemical or physiological science; but forces are at work which do not allow themselves to be analyzed the same as other actions with which we are familiar. In fact, this condition clearly tends to indicate the existence of some power within the body which is not a portion or parcel thereof. The law of the convertibility of force into matter, and *vice versa*, and the indestructibility of force and matter, being unquestioned, it is marvelous how any thinking person can entertain the belief that all the functions of the body cease with death, and all is ended. It is true that the chemical elements return to their original condition; but, as force cannot be destroyed, what becomes of the peculiar vital and mental phenomena? These conditions of facts are leading the most skeptical thinkers to the admission that there is something within the body—a spirit, a soul, a part of the macrocosm, if you please—which has not yet placed itself at the disposal of man's investigative inquiry, and which by the inevitable laws of God remains sealed to mortal man.

De Wette, the great learned rational "Universal Doubter" in Germany, admitted amid the "sneers of the acutest school of rationalism, of which he was the leader," the existence of something beyond materialism. Evolutionists and skeptics have within recent years placed more flexibility on former expressions, and even agnostics are gradually falling from their creed. Science and knowledge yield reluctantly to the inevitable truth.

An infinite existence certainly permeates all things which we denominate as living, and in the course of nature that existence is everlasting. There is no question that every living cell, from the simplest form of organization to the most complex, contains within it in a condensed spiritual form its full capabilities; its every possible reproductive power is there outlined, and by its very essence it is capable of filling space in any scale from the micro- to the macrocosmic. In this connection the well known fact may be mentioned

that breeders can reproduce a certain color or spot in an offspring, by exposing to the view of the parents during coition an animal of that color, or with that particular spot. How is that color transmitted? The spermatozoid carries stamped within its microcosmic compass the full spiritual form not only of the future being but of all generations therefrom to issue. There is no doubt but that "life" can exist without being observable by our senses, as it would invariably have to be in a material form for that purpose. No material substance containing "life," however, can exist without a spiritual outline. That such a form, which may be designated ethereal or spiritual, does exist is borne out by numerous invincible facts,—especially by the laws of physical reproduction and heredity. In cases where bodily injury is perpetrated nature reproduces or endeavors to reproduce the parts in full conformity with the existing outline, excepting in cases where the injured parts are too complicated. Illustrations in support of this fact are numerous,—especially so among the lower forms of life, as, for instance, among the crustaceans. Thus, in the tadpole the tail or entire leg is reproduced. Amputated human limbs or other complex parts are not reproduced because of their complexity; but the existence of their spiritual outline can hardly be questioned. It is well known that persons who have suffered amputation often complain of feeling pain in the toes or fingers of the amputated member, and also fancy that they are capable of moving them, but of course such action is purely imaginary on their part. It is not infrequent that pain is felt in the *spaces* (not the sockets) where teeth formerly were; artificial teeth are also said to "ache." The established laws of heredity furnish very satisfactory proofs of the existence of a spiritual outline (in a condensed or compressed form) in the spermatozoid, or ovum, or both; and one of its convincing proofs is well illustrated in the cases of six-toed or six-fingered persons, where successive amputations—in successive generations—of the supernumerary organ have failed to eradicate it in the offspring. A few years ago I saw somewhere expounded the theory that, by extracting in every person all the second bicuspids, in course of time those teeth would not be reproduced, and that thus the overcrowding of the teeth might be averted; but the foregoing practical illustrations prove the fallacy of that idea.

That the cells of the brain should within their physical selves contain the power by which its marvellous results are produced; that all forces originating from that central nervous organ should

take place on the same principle as all other productions of force,—namely, by the combustion of cells only,—is certainly very much in question; and the fervency of such an advocacy is mainly due to a formerly very prevalent skeptical notion of materialization,—it having been considered unscientific to entertain *any* views unless they can be demonstrated to the senses by known arts. However, the fact that such a substance as hydrogen or oxygen exists is not questioned, although neither has ever been observed by any of the senses. We judge of their existence only by their actions on other substances which we know to exist; and so we judge of spiritual existence by its manifestations. That such a substance as a vacuum exists—or such a condition, if you please—is not doubted, and yet no sense has ever perceived it. The word "substance" is proper when speaking of a vacuum, as a space containing absolutely nothing is inconceivable in the universe.

One other remarkable proof—which can only be referred to in this paper—of the existence of some unanalyzed power in the body is furnished by the wonderful process which has baffled physiologists from the time of Harvey to the present day,—the circulation of the blood. It is a remarkable fact that there is no physiological work extant which explains to the full satisfaction of the writer—skeptic or otherwise—that all the forces of the known body which are or could be utilized are sufficient to perform that process, if considered from a physical, mechanical or chemical stand-point. The propelling capacity of the left ventricle of the heart, the contractility of the coats of the arteries, the so-called suction force of the veins and the right ventricle, gravity, chemical affinity, capillary attraction, muscular compression upon the conduits, the affinity of the blood for oxygen in the lungs, and of the tissues for the same in the body, the siphon principle, or the influence of nervous force, etc.,—these and all other conceivable forces which are known to assist, or which are supposed to assist, in performing it are insufficient to complete it. Although some of them are very essential assistants, nevertheless the force of the "vital principle" is *the* primary power. All forces exist as such or as matter, in one form or another, and as the circulation of the blood is carried on (in addition to known physical, mechanical and chemical forces) by another and inexplicable force, that force lives on forever. By the withdrawal of that one activity, life, the known forces which perform the functions of the body are altered. The force thus withdrawn, whether it be vital, mental, or spiritual, exists in some form and somewhere;

and, indeed, it is but natural that the problem of life should remain unsolved. Its solution is the end of life, in the capacity and form in which we understand life; or, in other words, to learn life, death must ensue. The familiar words "in the midst of life we are in death" are equally true when transposed to "in the midst of death we are in life."

Animal magnetism, personal attraction and repulsion are certainly forces or conditions which come more or less under the observation of the dentist. There are not many practitioners who have made an effort to investigate the subject but will readily admit that there is "something in it;" and there is no reason why this power should not be cultivated and used by the dentist to the extent, at least, of producing partial anesthesia during short operations of a painful nature. There are unquestionably men who can control and direct such an amount of magnetism into the body of a patient as to insure insensibility to pain. This has really been done; and that this sustaining power is not due solely to a previous preparation of the mind to receive the impression that no pain would result (which might be the case, to some extent, if a person was told that he is about to be magnetized, and that in consequence thereof no pain would be felt during the operation) is based on the fact that the hands were simply laid upon the temples, the patient being informed, for the purpose of placing his head in the proper position and that he might become quieted. There are a large number of "nervous" persons who could be supplied by the majority of dentists, without very much loss to themselves, with a large amount of spiritual sustenance, which would help them to bear pain with more ease.

"In nervous persons the condition is a want of *nerve-force*, not a super-supply. Such persons when in the chair and being operated upon draw on the *sympathetic* operator for a re-supply of nerve-force to enable them to bear the operation. Some men whose own supply of nerve-force is too small even for their personal wants may, by greatly sympathizing, so impart of their nerve-force as to greatly benefit the patient, but always at their own expense; so that after a hard day's operating for such a patient as is here described the operator will be in a very nervous condition,—that is, his nerve-force has been imparted till there is a decided want felt. Take a woman who is prostrated from uterine displacements, backache, feeble health; no courage to bear pain; in other words, who is as nervous as she can be. If you will dampen your hands just a little and put them on her face and *forehead* for a few moments, you will

perceive the loss of an indefinable something, so that you will be constrained to say, 'I perceive that virtue (or force) has gone out of me.' I think direct contact is essential to this. In your operating for a robust, healthy person you will perceive the difference very sensibly. Strong, robust, unsympathetic dentists do not freely give off their nerve-force, and patients will soon distinguish the difference between such an operator and the one who in his make-up is more like themselves, with a ready sympathy, a free imparting of his nerve-force. They are very prone to patronize the latter rather than the former, so that, if you will notice, such operators have that class of patrons in a greater proportion than do the strong, robust dentists."*

There is no question in my mind but that nearly every patient is "influenced" more or less by the operator, or *vice versa;* so, for instance, in the latter part of an exhausting day's labor at the chair, a nervously powerful patient can supply sufficient spiritual power to the operator for his use to sustain himself without causing undue fatigue. Again, when both operator and patient are fully aware of a certain amount of pain which is to be inflicted to accomplish a certain operation, the patient, if spiritually so constituted, can "give off" sufficient power to not only assist the operator, but sustain himself as well, without the fatigue to one and pain to the other which otherwise would be the case. Dentists, especially such as number among their patients a large number of the puny, malformed products of the higher class,—those whose systemic functions have been impaired by over-study, lack of exercise, or faulty exercise in excess,—and such as live in feverish, malarial, and other districts where malignant diseases are prevalent, should cultivate the power of magnetic or spiritual influence over their patients. To be able to "give a piece of one's mind" is very near the truth, but is not grammatically correct; but to give one a piece of his spirit (which itself is an ethereal substance) is proper and capable of performance; and this is the secret of the success of a great many dentists. We among ourselves understand that influence by another name; we call it sympathy. Sympathy is nothing if it is not something which is capable of being imparted and made a part of the personality of another, and if it is such it is a something which from its nature may properly be called soul-force or spirit. Nay, more, the expression, "The heart goes out in sympathy," is as true as it is beautiful, for it is known that very sympathetic persons feel that a

* J. F. Sanborn, M.D., D.D.S.

something from their innermost selves draws towards the object of their sympathy.

This feeling of sympathy, then, is well worthy the cultivation of every dentist who treasures the welfare of his patients, and it is but meet that we should be so humane as to take advantage of all forces, of all known appliances or effects, to alleviate as much as possible existing pain, and inflict the minimum. It would cause surprise, to listen to the experience of patients who have been under the care of several operators (making due allowance for temporary causes of difference in susceptibility to pain), what a difference there is in a sympathetic treatment.

There are some essentials in the exercise of this function of spiritual sympathy which we should bear in mind when desiring to diminish the suffering of a patient from existing pain, or from pain inflicted by us in order to make our manifestations effective. The mere cold-hearted expression, "I am very sorry to hurt you so much," while a bland, icy smile is playing over our features, does not help the patient very much to bear the pain. Our professions, if it is necessary to make them by words, must be inspired by sincerity, truth and understanding; our actions must depict composure and steadiness. The patient should be able to read in our features that we understand his case, and that our professions of sympathy are sincere. Let our words (when speaking of pain) be truthful in every particular; let us not suppress the fact that pain must be consequent upon our actions. There is no harm, however, in measuring and stating the probable extent of pain. A steady, composed bearing should always exist, as thus the confidence of the patient soon wins the sympathy which the face expresses, or should express.

There is unquestionably, however, a class of persons who are either spiritually indifferent or negative, and over whom, therefore, no influence can be exerted; and in consequence of this belief there is an hypothesis that persons are electrically charged either positively or negatively, and that therefore affinity or repulsion exists among all persons. Just to what degree this is true we are unable to state; but all have observed the fact of the existence—to a certain degree—of such a condition. In cases of the kind where these pre-existing conditions are unfavorable the dentist should exert as much will-power as possible to overcome the existing antipathy, and this can be done in most cases with good success. There are persons, however, in whom the opposition to any influence is so marked that

both the patient and operator are unavoidably obliged to suffer pain or fatigue. These are generally patients who soon seek another dentist.

Mesmeric influence is another but similar exhibition of spiritual power, and consists of the ability of one person to transmit a portion of his spiritual substance—individuality if you please—to another in such a degree that pain may be produced or prevented at the option of the transmitter. Those who are fortunate in possessing this power undoubtedly exert a great deal of influence over their patients. Especially is this true in operations of a painful nature and short duration, where by bodily contact the operator imbues the body of the patient for a short time with his own spirituality to such a degree that the feeling of pain is diminished. The physical body in its normal condition, with the spiritual body also in its normal condition, are so equalized that when both work in natural harmony injury to any part of the sensibly known body is communicated by wires of transmission to the spiritual individual; that is, pain is a product capable of transmission the same as electricity, and when both bodies are normal the pain is felt, but if there is a supersupply of spiritual substance the pain is neutralized by that supersupply of vital force, and the result is that there is no pain. The law of the correlation of forces is therefore true, not only so far as it is applied to physical bodies, but as well to spiritual bodies. The extinguishing of the pain, then, is not annihilation, but only transmission into another form,—namely, into spiritual loss to the operator; which loss is by him, if healthy, not perceived as much as the pain would have been by the patient, because it is of a different nature, although the same in quantity. On the same principle, there is a difference between worry and thought; and as a proof that no force is lost, the illustration is familiar that a brick raised fifty feet retains just so much potential force as it required to raise it to that height. It can exert that force by falling. The movement of the hour and minute-hand and the friction of the wheels of the mechanism of a time-piece exactly equals the force exerted in winding the spring. Mesmerism has been known and applied extensively, especially on the Continent, in minor surgical operations, including the extraction of teeth, in which latter operation it will be more extensively applied when mesmeric influence is more thoroughly and independently investigated and its true virtues made better known.

Though not strictly within the province of this paper, perhaps it

will not be entirely out of place to notice one other fact, namely, that, although the Scriptures contain fifty-three different verses bearing upon the teeth (a number of these are mere repetitions), nearly all of them use the teeth merely for purposes of illustration, the same as the eyes or hands. Job is credited with saying, "I am escaped with the skin of my teeth." This sentence, if the literal meaning of the original Hebrew is correctly translated, expresses a truth which only the present century demonstrated, Nasmyth having discovered the *cuticula dentis*, a thin epithelial membrane covering the enamel of the teeth, and which is a continuation of the gum and the lining of the socket of the tooth, and in every sense appropriately called a skin. There is no question of its retention upon the teeth for some time after eruption, and indeed it is possible that it may remain throughout life.*

Discussion.

[Opened by Dr. J. J. R. Patrick.]

Dr. Patrick. So long as we are beings possessed of limited faculties, and are compelled to pass our lives in a world of unlimited quantities; so long as we exist as small as we are, and the universe exists as large as it is; so long as man is not born into the whole universe, but only upon a small speck in it, far away from the beginning of things,—as long as he is thus situated, with an unfathomable depth around him, opinions in regard to the soul, vital force, personal affinity, sympathy, antipathy, personal electrical influences, nervous influence, mesmerism (so called), motion, emotion, moving of the mind, agitation and perturbation can only express indefinite ideas of undefinable sensations.

"How different the emotions between departure and return."

All peoples in every known portion of the earth, from the uncivilized to the most civilized, who have ideas on any subject, have ideas on morals or rules of conduct, and we have but to pass from

* The following are the verses of the Scriptures wherein reference is made to the teeth: Gen. xlix, 12; Exod. xxi, 24, 27; Lev. xxiv, 20; Num. xi, 33; Deut. xix, 21; xxxii, 24; I Sam. ii, 13; I Kings x, 22; II Chron. ix, 21; Job iv, 10; xiii, 14; xvi, 9; xix, 20; xxix, 17; xli, 14; Psalms iii, 7; xxxv, 16; xxxvii, 12; lvii, 4; lviii, 6; cxii, 10; cxxiv, 6; Prov. x, 26; xxv, 19; xxx, 14; Cant. iv, 2; vi, 6; Is. xli, 15; Jer. xxxi, 29, 30; Eze. xviii, 2; Lam. ii, 16; iii, 16; Dan. vii, 5, 7, 19; Joel i, 6; Amos iv, 6; Micah iii, 5; Zech. ix, 7; Matt. v, 38; viii, 12; xiii, 42, 50; xxii, 13; xxiv, 51; xxv, 30; xxvii, 44; Mark ix, 18; Luke xiii, 28; Acts vii, 54; Rev. ix, 8.

Paris to Constantinople, and the decencies and decorums of life are no longer the same; a man may be a criminal at one or two points on the globe and innocent over all the rest of the world.

What is light? I know it is essential to vision, but too much light is darkness. What is the beautiful? Ask a toad, and he will tell you without hesitation that it resides in his female, and yet none but a community of toads will agree with him.

The subject of spiritual influence is one that has neither beginning nor end; it is one that all who think they have a soul feel capable of discussing; all feel equally strong because all float in the same void. If we consult the works of Plato, who has embodied the sum of all metaphysical philosophy in his writings, we will find the most exquisite ingenuity wasted with a prodigality that amounts to wantonness. No persons ever showed greater acuteness or strength of reasoning than the Platonic scholastics. But having quitted common sense and attempted to mount into the regions of an intellectual world, they expended it all in abortive efforts, which may amuse the imagination, but can never satisfy the understanding. The Platonists were both the restorers and corrupters of the ancient theology; they restored it from the mass of poetical mythology under which it was buried, but refined it with abstract metaphysics, which soared as far above human reason as poetical mythology sank below it.

The difference between philosophy and science, or metaphysics and positive philosophy, is a contrast of method. Philosophy proceeds upon a system of credit, and if she never advanced beyond her tangible capital our wealth would not be so enormous as it is. While both the metaphysician and the man of science trade on a system of credit, they do so with profoundly different views of its use. The metaphysician is a merchant who speculates boldly, but without convertible capital which can enable him to meet his engagements. He gives bills, yet has no gold, no goods to answer for them. These bills are not representative of wealth, which exists in any warehouse, magnificent as his speculations seem. The first obstinate creditor who insists on payment makes him a bankrupt. The man of science is also a venturesome merchant, but one fully alive to the necessity of solid capital which can on emergency be produced to meet his bills of credit; he knows the risks he runs whenever that amount of capital is exceeded; he knows that it means bankruptcy to him if capital be not forthcoming.

Now, all we ask of the man of science who proposes to utilize spiritual force (as a force different from any other force), is to first

prove the presence of the spirit, before asking us to go further. We may admit that if present the spirit may be capable of producing phenomena, but we cannot permit the assumption of such a *presence* merely to explain such phenomena; for, if the fact to be explained is sufficient proof of the explanation, we might with equal justice assume that the phenomena were caused by an invisible dragon, who produced them by the vibration of his awful wings, in the same manner that many such phenomena are accounted for in China.

We must never forget that beliefs in the human mind, whether they be pure or mixed with errors, can neither control nor even exercise any influence whatever upon what is really taking place in external nature. What is really going on in nature is to be ascertained, so far as it can be ascertained at all, not by projecting human beliefs into external existence, but by applying whatever little of dry light we can win from the slow but gradually encroaching progress of scientific discovery,—in other words, progressing from the *known towards the unknown.*

A patient leaves one dentist because he is supposed to be rough, and goes to another, who, owing to the nature of the operation, gets the credit of being easier. Would the last operator be justified in claiming for himself more enlargement of soul, or more spiritual influence over his patient? Aside from the nature of the operation, the patient may be in better condition to undergo the fatigue at one time than at another, and thus the operator obtain credit that really belongs to the patient.

Now, an individual under temptation resists it at one time because he is strong, and succumbs at another because he is weak. Had he been the last time as he was at the first, he would not have succumbed. There is a state favorable to virtue as to vice. How many errors would we save ourselves from, how many temptations to do wrong would we keep from springing up, could we but force the animal economy, which so often disturbs the moral order, to favor it! Climates, seasons, sounds, colors, light, darkness, the elements, food, noise, silence, motion, rest, all act on our physical frame, and thereby on that something which we call mind.

The myriads of constantly recurring effects produced by causes which appear to have no connection are phenomena, both of organic and inorganic nature, which have long attracted the attention of mankind, and few of them have been satisfactorily explained.

The operation between distant bodies cannot be traced to any medium of communication, yet there is an attractive and a repulsive

power in all substances, animate and inanimate, however near or however far, that cannot be defined. Every substance has inclinations or antipathies; is attracted with more or less strength by one body, indifferent towards a second, and constantly avoiding a third. Sympathies are of a physical or a moral nature. The first consists of a consent between the different parts of the organism, the latter of certain impressions, unaccountable, unconquerable, that harmonize in a multiplicity of phenomena various individuals, or that induce them, without their being able to assign any reason or motive to warrant the repugnance, to avoid each other, and not unfrequently to entertain feelings of disgust or horror. Organism instinctively obeys the voice of nature. Moral sympathies are faculties that enable us to partake of the likes or dislikes of others; although this sentiment is by no means reciprocal, for we often dislike those who fondly love us, for the reason that, while sympathies are instinctive, education and habit will destroy or suppress the physical sympathies between individuals and communities. The study of sympathies must always take first rank with the physiologist; and upon this alone can the physician base his investigations of the various diseases which afflict mankind; for symptoms arise from sympathies. Without a knowledge of the one a clear insight of the other is impossible.

Magnetism is supposed to be that reciprocal influence which exists between individuals, arising from a state of relative harmony, and brought into action by the will. It is also stated to exist in a peculiar fluid transmissible from one body to another under certain conditions of each individual. *These conditions, however, are very uncertain*, and until we know more of the certain conditions of magnetism, gravitation, and electricity we cannot reduce their action to rules of practice. The history of this doctrine is curious if not instructive. The ancients fully admitted the power of sympathy in the cure of diseases; but generally attributed its action to the interference of the Divinity, or the operation of sorcery and enchantment; and this belief is not to be wondered at when we reflect that the healing art was confined exclusively to the priesthood.

A remarkable affinity can be traced between modern magnetism and its supposed phenomena and the relations of the Pythian and Sibylline oracles; the wonders of the caverns of Trophonius and Esculapius, and the miraculous dreams and visions in the temples of the gods. Amongst the Hebrews, the Egyptians, the Greeks and the Romans we constantly meet traces of this supposed power

of manual apposition, friction, breathing, etc. But the finest specimen of the sympathetic power of corporeal apposition was illustrated when Elisha, in order to revive the widow's dead child, stretched himself three times upon him, and invoked the Lord's assistance by prayer. "He lay upon it, put his mouth upon his mouth, his eyes upon his eyes, and his hands upon his hands, and he stretched himself upon the child, and we are informed that the child opened its eyes." Plutarch informs us that Pyrrhus cured persons with diseased spleens by passing his hand over the seat of the malady. Apollonius brought a young girl to life by touching her, and leaning over her as though he were whispering some magic words in her ear. Now, as the progress of intellect dispelled the dark clouds that shrouded the middle ages in superstitious and credulous practices, philosophy endeavored to investigate the nature of this mysterious agency which priests had for so many centuries usurped as their special gift and property. Skeptic as to the agency of supernatural powers in the common occurrences of life, philosophers attributed these phenomena to some peculiar principle with which organized bodies were endowed. Hence arose the doctrine of animal magnetism, which is embodied in the language of Paracelsus, promulgated in the year 1493: "All doubt destroys work, and leaves it imperfect in the wise designs of nature. It is from faith that imagination draws its strength. It is by faith that it becomes complete and realized. He who believeth in nature will obtain from nature to the extent of his faith."

Belief is a necessary factor, both on the part of the patient and the operator, in producing the phenomena known as animal magnetism, as enunciated by Mesmer, and afterwards called mesmerism. Mesmeric influence! You might more properly leave out the word "mesmeric," and call it influence,—undefinable influence. The prefix "mesmeric" throws no light on the phenomena. The living influence of Jones over Smith, or Smith over Jones, is a more satisfactory phenomenon to investigate. There are plenty of professional gentlemen who honestly believe that their power over their patients is absolute,—that their will is law; that they have only to direct the line of treatment, and whatever sacrifice may be required, their patients will instantly and willingly submit to. I confess that I have not yet arrived at the possession of this fascinating power, nor do I believe it would be desirable, if I did possess it, to exercise it. In a majority of cases that have come under my control I have found by experience that the more influence I have expended on my pa-

tient during an operation the less influence I had in collecting my fees, and the mountain that I thought was looming turned out to be a miserable hut as soon as the fog was scattered.

Dr. Spalding. I wish to compliment my young friend for the matter contained in his essay, and for the able manner in which it was delivered. I regret that Dr. Patrick is so much in error in his statement of physiological facts, and that he bases his theories on what he learned before the science attained its present status. There is a difference between soul and spirit. Man, we are all aware, has an external and an internal nature. Through the external he takes cognizance of external things, and through the internal of mental or spiritual things. Soul and spirit, often used synonymously, are very distinct properties. When we go into the spiritual world we shall have no less a spiritual body than we now have a physical body. Briefly, the soul is the spiritual body. I have not time to enlarge upon this topic, and will only say it dwells in us to-day, and the physical body is developed through its agency. Spirit is that vital energy which flows into the spiritual body from the source of all life. Soul is that organism which receives it.

The male spermatozoa can be elaborated only from masculine blood. It contains the germ of the future being, both spiritual and material. The soul always comes from the male parent. The body is derived from the mother. The inmost qualities of animals as well as men come from or through the male. If an animal were to impregnate a woman the offspring would not have a soul, for the reason I have just stated.

OPERATIVE DENTISTRY.

BY DR. GEORGE H. CUSHING OF CHICAGO.

I wish to say a few words, not in apology but in explanation, of the character of this paper.

When I accepted the invitation of the chairman of your executive committee to write a paper on operative dentistry, I thought there were some points in three distinct subjects which might perhaps be profitably considered at this time and grouped under this head.

It was not intended that this should be even an attempt at an exhaustive consideration of the matters referred to, but that it

should briefly present points of importance for consideration, the discussion of which could not fail to be beneficial. The points I desire to present are, first, the province of operative dentistry and some of the essential qualifications for its practitioners; second, some of the constant causes for the failure of fillings; third, the necessity for greater thoroughness and conscientiousness in the treatment of pulpless teeth.

The time was, doubtless, when the dentist was expected to confine his operations exclusively to the teeth,—organs which were at that time regarded as of little more importance as to their connection with the body as a whole than other cuticular appendages, as the hair and the nails. His duty was bounded by perhaps three operations,—the filling of such cavities in the teeth as readily admitted of such treatment, the extraction of all other teeth that were in any degree painful, and the rough and imperfect scaling of the teeth when nearly imbedded in salivary deposits.

When such views were held of the relation of the teeth to the general economy, and when their value was estimated no higher than is thus indicated, it could only be expected that the practice of operative dentistry would be considered as simply a mechanical one, and that the qualifications necessary for such practice were correspondingly limited.

To-day, how is it?

It has come to be understood that the teeth are essentially parts of the living organism, connected through the great sympathetic system of nerves with every other part of the body,—that diseased conditions of the teeth may cause serious disturbance of organs and parts the most remote, and that remote parts may, through diseased conditions, as well affect the teeth. It has also been learned that the teeth themselves are subject to various diseases independent of caries, all of which are more or less amenable to treatment.

In the days when operative dentistry was regarded as simply a mechanical craft the medicaments used by the practitioner consisted almost solely of two articles,—creasote, and opium in some of its forms,—which were used simply to relieve toothache. To-day there are not less than twenty or thirty remedies which the intelligent dentist regards as essential in the local treatment of various conditions, without referring to the many constitutional ones that are frequently indicated, all of which are more or less efficient in aiding nature to effect cures of the various ailments to which the teeth and adjacent parts are subject.

There are many diseases located in the teeth alone, while of the adjacent tissues may be mentioned as some of the more frequent, hypertrophy of the gums, inflammation of the gums, recession of the gums, pericementitis, pyorrhœa alveolaris, alveolar abscess, various affections of the antrum of Highmore, and necrosis of the alveolar process; and it is continually necessary to treat the teeth in order to relieve diseased conditions in other parts of the body, especially in the eye and the ear. All these diseased conditions, presenting great variety in their characteristics, it is expected that the dentist of to-day will be fully competent to treat, and patients are placed in his hands with the confidence that he is thus competent. Beyond the conditions above enumerated, certain surgical operations and treatment properly lie in his province, such as the setting of broken and dislocated jaws, the removal of certain necrosed parts and of certain tumors of the gums, and the like, and the general practitioner of dentistry should be competent to deal with such cases.

Now, what qualifications are necessary for the performance of these duties? For the intelligent performance of the mechanical operation of the filling of teeth alone a man needs to understand the laws of physics and mechanics, and to be trained to a keenness and nicety of observation and a delicacy and skill in manipulation not required in any other pursuit. But before a man can be justified in attempting these mere mechanical operations, no matter how skillful a manipulator he may be, he must be competent to decide when it is proper to perform them, or what preliminary treatment is required, if any. This necessitates a knowledge of the relation of the teeth to the general system,—of the various sympathetic symptoms which diseased teeth may give rise to, or, on the other hand, that may appear in the teeth when originating in diseased conditions of remote parts, and also an acquaintance with the action of the various remedies it may be necessary to employ. This knowledge can only be obtained by the study of the nervous system and of therapeutics.

When we get beyond the mere mechanical operations and the judgment which should determine their performance, and come to treat diseased conditions other than that of simple caries, we find ourselves entering the domain of physiological activities, and must be familiar with the laws governing these, as well as with those determining their various aberrations,—which aberrations cause what are termed pathological conditions. Here, again, we must be familiar with the more numerous remedial agents we may have

occasion to use,—their mode of action, their possible dangerous properties, and their value as aids to nature in her efforts at restoration to health. Only the study of therapeutics and materia medica can qualify us in this field of practice. When we come to the treatment of abscess, the setting of broken or dislocated jaws, the treatment of necroses, the removal of tumors, or the exploration of the antrum, we must have added to all the qualifications heretofore enumerated a thorough knowledge of the anatomy of the parts we are to operate upon, and as well of the principles of surgery.

These propositions are simple aphorisms,—they cannot be disputed,—and, in view of this fact, is it too much to insist that young men entering upon the practice of operative dentistry should so qualify themselves as not to bring reproach upon the profession of their choice, and that they should realize that when they have technically completed their education,—that is, the course of study required by the schools,—they have only just laid the foundation of their education, and that the superstructure can only be carried to completion by the closest and most constant study through life?

When those seeking to enter the ranks of the dental profession come fully to realize this, then we may hope for a progress in the true professional sense such as the past has not yet witnessed. The signs of the time are propitious to this end. The public mind is being educated and demands a proper qualification of its professional men; the schools recognize the importance of a more thorough training of their pupils and are continually advancing their standard, while the young men entering upon such study are more generally, though in a dim way, realizing the importance of the suggestions here so briefly presented. We may, then, hope that the next decade shall develop a class of professional men who will bring credit and honor to our ranks, and whose ministrations shall have a greater beneficence in proportion as their qualifications and earnestness are greater.

I come now to speak of the second subject—some of the constant causes of the failure of fillings. That there are constantly operating certain causes which result in the failure of fillings, needs not to be stated. The daily observation of every one of us too sadly tells the tale. Some of these causes are appreciable, while others are not. It is only of the former that I propose to speak.

The first cause to which I would call your attention is the improper or imperfect preparation of cavities. It is safe to assume that a very large proportion of cavities are not as thoroughly pre-

pared as they should be, and as many of them could be. As a rule, cavities are not sufficiently enlarged at their margins to entirely remove, not only that which is completely disintegrated, but that which is partially so. This may occur where cavities are so situated as to be reasonably well examined by the eye, but is very apt to where the cavities cannot be thoroughly examined in that way. Even those cases, or many of them at least, which appear to the eye to be perfectly prepared would, if they could be examined out of the mouth with a microscope, present unmistakable evidence of minute points of imperfection which sooner or later would prove destructive. The only remedy for this cause is to be found in a greater thoroughness in our practice,—that is, by cutting away much beyond the line that may appear to us to be perfectly sound; for there is doubtless an infected zone around the margins of most cavities that perhaps the strongest lens applicable to this position would fail to reveal, which is in the earliest stage of disintegration, and would under unfavorable conditions rapidly break down. In this connection I think a more general use of the lens for critical examinations of the margins would materially reduce the failures due to the cause we have been considering. Again, cavities may be perfectly prepared as regards the removal of all diseased or even infected territory, and yet by reason of our having left weak or thin walls of enamel overlapping, the fillings will be in constant danger of failure by the breaking down of these frail points—a failure which is certain to occur sooner or later. The remedy for this is obvious,—*i. e.*, not to leave any such weak points standing, but *cut* them away, so that they cannot *break* away. The second cause to be mentioned is one which is prolific of mischief doubtless to about the same extent as the first,—as regards proximal cavities,—and this is the failure to perfectly adapt the gold to the margins of the cavities, particularly the cervical margins. This is largely due probably to the exclusive use of cohesive gold, which is much more difficult of application in these positions than the non-cohesive. To obviate this cause of failure, the use of non-cohesive gold at the cervical margins, with a more thorough and careful manipulation at such points, should be practiced. It is not claimed that cohesive gold *cannot* be as perfectly adapted to the margins as non-cohesive, but that the majority of operators would be more successful in the use of the latter.

Another prolific cause of failure is to be found in over-malleting upon the margins. This is probably the cause of more mischief

than is generally suspected. The edges of enamel, no matter how well prepared, cannot withstand more than a certain force of impact, and we cannot determine with accuracy just the amount in any given case they are able to sustain. Hence we should exercise the greatest care, and be sure to err on the right side. The tendency to extreme malleting is very strong, and the fact that much more gentle force than is generally used would be equally if not more effective is apparently not at all appreciated. To correct this error would probably be more difficult than might at first appear, from the fact that we cannot easily change our judgment as to the amount of force proper to be used, after a long-established habit which we have felt was justified, and also because of the difficulty of judging *de novo* what amount of force it would be proper to apply. The safest method, doubtless, would be to use hand-pressure over the margins until they are covered with a sufficient bed of gold to enable them to bear the mallet force.

The next cause I shall mention may be found in the improper shaping of the proximal surfaces of teeth where separations are made, either by cutting or grinding, or by wedging. In all such cases, where it is at all practicable to do so, the surfaces should be so shaped that in the event of the teeth approximating closely the gold should come in contact rather than the teeth, and that toward the grinding end of the tooth, so that a free space may be left at the necks of the teeth. In the case of that class of teeth which naturally present large plane surfaces on their proximal sides, they should be cut away on their buccal and palatal aspects, and so filled as to present the same kind of surfaces as above described. Were such teeth wedged apart and filled, and permitted to retain their natural shapes, the chances of failure upon their coming together would be manifold greater than if shaped as indicated above. This is one of the cases in which to retain or to attempt to perfectly restore the natural contour would be to invite disaster.

Finally, one of the great causes of failure is to be found in the attempt to do in an hour that which requires two hours for its proper performance. There is probably no fault so prevalent among dentists as this, and it stamps failure upon very many operations that, if given ample time, would not fail. Hasty, slip-shod operations bring reproach upon the profession, destroy the confidence of the patient and the reputation of him who performs them. The only influence that can remedy this evil must come from a higher appreciation of our duty as professional men, and a more conscientious performance of that duty.

The above are among the most potent and continually present causes of failure, and though they have repeatedly been written and talked about, they will continue to require to be impressed upon our minds so long as we are fallible and liable to error.

There are other causes which might claim attention, but they will undoubtedly be brought out in the discussions.

I come now to present some thoughts on the necessity for more thorough and conscientious treatment of pulpless teeth. The articles that have recently appeared in the *Medical Record* on this subject ought to awaken the profession to the importance of its consideration. While some of these articles from medical men exhibited great ignorance of the resources of the dental profession, and their conclusions were entirely unjust and absurd even, yet the facts upon which they were based were sufficiently alarming to arouse us to renewed efforts to secure not only a proper understanding of this matter, but a more conscientious carrying out of the operations necessary to insure success.

The fault is not that the proper treatment of pulpless teeth is not well understood theoretically, for there is no one subject perhaps that has been so thoroughly considered and demonstrated as this; yet it is very evident from the teaching of daily experience that there must be a criminal carelessness on the part of very many of the profession, who ought thoroughly to understand this subject, and the manner of performing the operations called for in this class of cases. There is hardly a day passes that competent men in the profession do not witness the evidence of this carelessness, in varying manifestations ranging from the incipient soreness upon touch—which precedes extreme inflammation and abscess—to the gravest complications of extensive necrosis. These evidences come not alone from the hands of country dentists or of those not high in repute, but too frequently from the hands of gentlemen holding high positions in the communities in which they live, both with the public and their fellow practitioners. This carelessness doubtless arises largely from the fact that the treatment of these cases demands, many times, more patience and is attended with more annoyances than any others with which we have to deal.

The delay frequently necessary in treatment before the final operations can be completed, becomes to some practitioners exceedingly irksome, and they are tempted to force matters. Again, some patients are very nervous and suffer greatly in having the root-canals of such teeth properly cleared, and here some operators are tempted to try

to fill the roots before the proper time, trusting to chance for fortunate results. It is hardly necessary to say that such men are very apt to perform the operation of filling the roots in a slovenly and imperfect manner, and so the foundation is laid for evil consequences to follow, as undoubtedly they do in a large majority of instances, and partially justify the sweeping charges which have been referred to as having appeared in the *Medical Record.*

I said that the proper method of treatment was well understood theoretically. Perhaps I should modify that statement by saying that it has been so thoroughly taught and demonstrated that there is no excuse for any ignorance among respectable practitioners regarding it. And yet there evidently is ignorance where it would not be looked for.

A friend of mine was invited to a gentleman's office to advise him regarding a certain case, and while there he became satisfied that the gentleman did not fully understand the method of filling roots, and offered to show him his method. When he went to his office again for that purpose he had to make all the instruments necessary, for the dentist had not even a broach fit for the purpose, nor any proper instruments for removing the contents of the root-canals. And yet this dentist was professing to treat pulpless teeth scientifically, and to properly fill their root-canals. He was a member of a first-class dental society, and had heard described and seen demonstrated the thorough method of treatment repeatedly, and yet, as you see, was utterly ignorant of its practical application. When such men, enjoying all the advantages coming from association with the best men in the profession, commit such stupendous blunders, is it to be wondered at that that much larger class who have no such advantages, and who do not desire them, should by their continual malpractice furnish seeming justification for the sweeping condemnation by medical men of the practice of retaining in the jaws pulpless teeth?

It is not my purpose to detail the proper methods of treatment here,—only to insist that thoroughness should characterize every detail of the procedure. The canals should be as thoroughly cleansed as may be; should be absolutely disinfected, and as perfectly filled as delicate and careful manipulation will render possible. In order to secure this thoroughness, it is necessary that the rubber dam should be applied; that ample time be given to each step of the operation, and nothing be left to chance where certainty can be attained. In this way alone can we hope to establish a repu-

tation which will in time obliterate the stigma which has been placed upon us by medical men.

In closing, let me say that if by the disjointed and imperfect presentation of the matters I have here attempted to bring before you I shall have succeeded in arousing any to greater earnestness in the endeavor to reach perfection in our art, I shall feel that my effort has not been in vain.

Discussion.

[Opened by Dr. W. H. Taggart of Freeport.]

Dr. Taggart. When dentists shall realize that thoroughness in all branches of our profession should be the constant watchword, then we will succeed in saving more teeth than is done at present. There can be no better way in which to start with this thoroughness than by insisting on putting the best material into our ranks. A person who has not had considerable previous discipline in the way of study cannot grasp all that is taught in our dental colleges in two years, or graduate with any particular honor to the college or himself.

Some might say that by *insisting* on this good preliminary education we would debar worthy young men. But it is my opinion that, if any young man has thought he would like to become a dentist, and is kept from joining us by the high standard we have fixed, it is so much the better for the dental profession.

I think that when the time comes for dentists to charge for work by the hour, the work will be more thoroughly done, and consequently more teeth will be saved. At the same time it will be only dealing justly with our patients. As a dentist's time is his stock in trade, it is only fair for patients to pay for as much of his stock as they take.

In reference to soft foil at the cervical wall of a cavity, I could never see any advantage from it in my hands. While I will admit that soft foil will spread more easily than cohesive, I can't see that the spreading quality is as great an advantage as the welding property of cohesive foil. The gold at this point should never be put in in such quantities as to require any great force to adapt it to the walls, and it always seemed to me that, if I could put a piece of gold at a certain point, and have it stay there, I could more thoroughly adapt it to the walls than by relying on an uncertain amount of spreading.

Without doubt there has been more discussion within the past

few months concerning the injurious effects of pulpless teeth than at any previous time. I refer to the articles recently published in the *Medical Record*. If we could look upon the medical profession as competent critics when they condemn pulpless teeth in the mouth, we as dentists might feel as though our work in the direction of saving these teeth was all for naught. There is not one among us but positively knows that these teeth can be made useful and comfortable organs, and when dentists see and have to deal with thousands of these teeth to where physicians do one, it makes the least one of us a more capable judge than their busiest practitioner. Another point,—there is no one more ready to condemn these dead, diseased teeth than the dentist himself; and how often we say to our patients, "If you intend saving these teeth, do so at once; if not, have them extracted, because the pus and foul accumulations continually going into the stomach will be liable to make you sick, and *can* cause all the disagreeable feelings you complain of in your head."

In the treatment of pulpless teeth, we need the very best and toughest of little broaches, and none that I have ever used are equal to those made from piano-wire. They have sufficient spring to keep them from kinking up, and consequently breaking off in the roots. Some dentists are in the habit of ignoring all roots into which they cannot pass a *barbed* broach, saying if the canal is so small the amount of decomposed pulp can do no harm. This is a mistake; the barb on any of the broaches we buy makes that broach almost twice as large as it would be without the barb; consequently a great many roots remain uncleansed that might be just as thoroughly cleansed as larger ones by using smooth broaches. My way is to take the smooth broach and lay it on the bench, and draw-file it with a No. 1 separating file. This makes little grooves lengthwise on the broach, and it will then hold the finest shred of cotton without any danger of its coming off, and those who have not tried these broaches will be surprised at the small canals they can follow. Do not rely as much on medicines in these small roots as you do on the small, delicate broach, skillfully used. In doing this thoroughly you will find less and less need for medicines, and a great deal more satisfaction.

I think considerable harm is done by some extremists in recommending remedies. Here is a dentist who might have been reasonably careful in cleansing canals by working hard. He sees an article in a magazine recommending, say, iodoform, stating that it will thoroughly disinfect a root, and that it has been applied to the pulp-

chamber without any cleansing and the cavity sealed up, and the tooth has remained comfortable now for two months. What a bait for the dentist who is inclined to be careless. He grabs it and says all the hard work of cleansing roots is over; the consequence is, that case, or any other treated in the same manner, will be a failure. Another recommends bichloride of mercury to mummify the pulp. Mummify sounds very well, but beware, for tooth-pulps will not *stay* mummified as the old Egyptians did. Another recommends liquid gutta-percha to fill roots with,—possibly as good a thing as we can use,—but spoils it all by saying that it can be pumped in, and if any goes through the end of the root no trouble will follow, as it will become encysted, as even a bullet may in a man's flesh. But bear in mind that where one man lives with an encysted bullet in his body a thousand die, because the bullet would not become encysted. Be delicate and extremely careful, and remember that there never yet has been a root-canal any too thoroughly filled.

Dr. Kulp. To make a very convenient broach and broach-holder, take half of a broken excavator; drill a hole into the end of it just large enough to admit ordinary piano-wire; cut the wire the length desired for a broach; drive it into the hole until it is held firmly; the wire can now be filed to any thickness desired. The point may be left smooth, or can be hooked for a pulp-extractor. There is less danger of breaking such a broach in the canal of a tooth than any other I am familiar with.

As a material for root-canal filling I use "Os-artificiel," first mixed on a glass slab to the consistence of cream, then conveyed into the canal on a shred of cotton wrapped on the end of a smooth-pointed broach, such as I described before. With this instrument it can be forced to the apex of the root. On account of the antiseptic property of this material I consider it the best canal filling we have.

The fillings in carefully prepared cavities often fail at their marginal walls. You cannot perfectly adapt gold to a sharp edge of enamel. By beveling this wall this difficulty is obviated, as the gold will hold the enamel, and *vice versa*. In regard to the contact of proximating walls, I should not permit the contact to be in the region of the margin of a cavity.

As to the article in the *Medical Record* referred to, we are just "reaping what we have sown." For years past exposed pulps have been capped indiscriminately, and thousands of such pulps have died. It is quite opportune to have our attention thus sharply called to the true condition of things by the medical men. The warning

given by some of the dental men years ago has not been heeded. I believe good will result from such articles; I hope more will be published, until all will "make haste more slowly."

Dr. McKellops. I have said so much and have so often been the advocate of methods of root-canal preparations and filling, that it hardly seems necessary for me to refer to this subject any more. However, I do wish to impress on your minds the utility of the Swiss jewelers' broach No. 10 in the treatment of root-canals. These broaches are very delicate and easily entered into the finest canals, and are quite durable. The majority of teeth with dead pulps have very little matter within the canals requiring a barbed broach for its removal. The contents consist usually of broken-down and softened tissue, which can be removed without incurring the risk of passing a barbed broach. He must have more nerve than I who will enter an ordinary root-canal with a barbed broach.

I feel repaid for my trip here from simply learning from Dr. Newkirk how to better wrap cotton on a broach. I know of cases of canal fillings which were made twenty-eight or thirty years ago by Dr. Clark, who taught me first the use of the broach. Dr. Badger was the first to introduce root-filling by using gold foil on a broach. My method of drawing the temper of the jewelers' broaches is to place a dozen in a tin box the size of a finger; fill with unslacked lime; heat the whole red hot, and allow it to cool slowly. They are then to be polished with a pine stick, with pumice, on an Arkansas stone.

I have watched and been interested in all the operations at the clinics to-day, but I saw not a single Jack matrix used, though they are invaluable to one who expects to make first-class operations. Let me again call your attention to the waxed tape as recommended by Dr. L. D. Shepard for separating teeth. If the space is very small, use rubber to start it, and from two to six days will give a good space ordinarily, though in the severe cases more time should be taken.

Dr. Newkirk was asked to demonstrate his method of wrapping a broach with cotton, which is as follows: He takes some fibers of cotton and pulls them out so that only a few will reach to the point when placed; holds these fibers between the thumb and finger of the left hand, and applies them to the broach just far enough from the handle to give room for the right thumb and finger to follow. The handle is now entirely let go; the right thumb and finger grasp the broach near the handle, including some of the cotton, and the whole is rapidly revolved. Meantime the left thumb and finger only

press the fibers to the broach as they gradually slip along on the same to the point. In this way one or two fibers may be securely wrapped on the finest broach (as was successfully demonstrated). The doctor also showed some useful handles for Swiss broaches, which are easily made from cigar-box wood, using shoe-eyes with the flange filed off for ferrules.

Dr. Wm. N. Morrison. The subject of root-canals is one that interests me deeply. There is one point regarding them which was not brought out, viz.,—the manner of preparing the canals themselves. Some operators ream out—enlarge the canals; but I am opposed to such treatment. The filling material should be adapted to the canal, and not the canal to the filling material. The walls of a root-canal are usually smooth (unless abnormally obstructed), and a broach can ordinarily be introduced into them without difficulty.

Dr. Morrison here explained a method of making an oxyhydrogen blowpipe by burning a mixture of nitrous oxide and hydrogen gases, the apparatus for doing which he said was a reproduction of one first introduced and used by Dr. R. Knapp, of New Orleans.

Dr. Ingersoll. It occurs to me that too much is said concerning the mechanical, and not enough concerning the therapeutic, part of our work. To treat and preserve a diseased tooth is the grandest service we can render. Much is said about saving pulps. We can sacrifice everything but the alveolo-dental membrane. More attention should be given to the treatment of this tissue in its diseased conditions. We should take it for granted in every case of spontaneous death of the pulp that the root membrane is diseased. Another point: We are accustomed to think that the successful operator must close the apical foramen with the filling material. I do not think any operation of this kind is complete until nature has closed the foramen with cementum; none are permanently successful without this. This operation of nature was accidentally discovered by me ten years ago. A tooth which I was then treating for abscess was again seen after an interval of three months, when I expected to make another dressing. By introducing a broach I was much surprised to find it would not pass the apex. Nature had sealed it up.

Dr. Black. The paper needs no commendation; but Dr. Cushing spoke of one fact, as I take it, in regard to the preparation of cavities, viz., that we do not always cut far or wide enough to embrace all the tooth-substance in proximal cavities which is invaded by decay. This is specially true of distal cavities in upper second molars.

Examine your case with a lens, and if one part of the thickness of the enamel constituting the margin is a lighter shade than the other, it is softened, and should be removed by cutting down the margin still further. The lens will also detect injured prisms.

Get a few fresh teeth from your neighbor who extracts more than you do. Shave off some infected enamel onto a cover-glass, and after carefully staining, examine, and you may be able to demonstrate Miller's coccus (the alpha) of caries. These are not able to penetrate normal enamel, but after the prisms have become partially separated (or an occasional one is dislodged) by the acids produced by the coccus lying on the surface, or in the dentine, then the organism will enter the enamel. When this whitened portion of enamel is the outer portion,—surface portion,—the softening has occurred from organisms that have been suffered to lie comparatively undisturbed on the surface of the enamel. If it be the inner surface or portion of the enamel, then the organisms have grown in at the junction of enamel and dentine. I have found that these cocci often penetrate deeply along this line in teeth that are not very perfect in their structure. This proves that unless all the affected portion is entirely removed you will soon have another filling operation to perform. Hence you will make a better operation to cut away very widely in the region most liable to decay.

One other point, and I am done: When a cervical margin is left standing up from the floor, having been undermined by caries, it should be cut down to avoid the risk of its being broken by the mallet.

Dr. A. E. Matteson. In a tooth with a proximal cavity at or very near its neck, would you open it up by cutting through from the grinding or labial surface?

Dr. Black answered: I should either cut down from the top, or enter from the side; and should probably in either case be sorry I had not done it the other way.

Dr. McKellops. Such cavities in second molars of either jaw should be opened from the side.

Dr. Cushing. Will Dr. Black please explain why he thinks a zone of infected tooth-structure exists beyond what can be discovered with the eye, and the reasons which warrant the cutting that he thinks is necessary.

Dr. Black. The best evidence of the efficacy of cutting away deeply is in the fact that fillings in cavities so prepared are more durable. In enamel the infected zone cannot be demonstrated farther than it is indicated by the white line.

Dr. Brophy. Prof. Black has said that the white line on the enamel at the margin of the gum is due either to a pathological condition of the gum or the presence of micro-organisms. What of the theory that this white line, which is the beginning of decay, may be caused by lactic acid formed in the mouth?

Dr. Black. You cannot get the changes in starch which produce lactic acid without the presence of micro-organisms,—without life processes. Many forms of life produce lactic acid, and according to Krause and some other very competent observers, the absorption of bone, in the removal of the roots of teeth (dentine), and in the formation of an abscess cavity in the bone in case of alveolar abscess, and other forms of absorption, is performed in a large measure, at least, by the formation of lactic acid by the odontoclasts or osteoclasts in apposition with the part being removed, and it is also probable that this acid is formed by an irritated gum about the necks of the teeth. There is no difference in the principles of physiology in the formation of this acid by the tissues and in its formation by micro-organisms. There is probably a difference in the detail of the processes, however. The absorption of bone is a physiological process performed by cells belonging to it. Decay of the teeth is a physiological process performed by cells—organisms—*foreign* to the teeth. The principles of physiology in the two processes are closely related.

Dr. Crouse. Some of the most difficult questions for the operator to decide have not been discussed. One is, when operating on approximal surfaces of the teeth, what plan to adopt to secure the best results. For instance, how are you going to get room to operate? Should the teeth be wedged previous to filling, or cut apart and permanent separations made? Which plan will be likely to result in the most good, both as to durability and comfort to patient? I should say as a general rule it is best to wedge the teeth rather than cut spaces, and yet many times the latter seems the best plan to adopt. I consider this one of the most difficult questions to decide in dental practice, and one requiring much thought and good judgment. The shape of the teeth, the way they antagonize, the tendency for caries to recur, the character and shape of the gums, the age of the patient, and care taken of the teeth, must all be taken into account to enable the operator to decide what is best in each individual case. As a general rule, teeth that are wide at the grinding surfaces and small at the necks should not be cut apart, because the wide space at the gums interferes with mastication. If the gums and alveolus

are heavy, there is apt to be a pocket formed, which adds greatly to the chance of caries recurring, besides giving discomfort to the patient in chewing, if permanent spaces are made through to the gums.

If the occlusion is such that when spaces are cut the teeth will soon crowd together again, cutting apart is generally bad practice; or if the patient is quite young, so that the teeth scarcely occupy their natural positions, cutting apart is hardly justifiable. On the other hand, where there is much tendency to caries with a lack of care on the part of the patient, contouring is not good practice, because the time and exhaustive labor required for such operations are almost sure to be rewarded by a quick recurrence of caries. Permanent separating is then almost the only thing left. So that no special rule can be given, but each case must be left to the careful study and good judgment of the operator. Cleanliness is another important matter. Until we get the patient to doing his or her part in taking proper care of the teeth, it is of but little use to try to make permanent operations. This is especially true with regard to children. I have repeatedly sent children home and set another time for them to come on purpose to examine and show them where they fail in this particular. It is said that the pulp-capping practice has changed. I have seen no reason for changing my practice in this particular. I cap pulps quite as frequently as I ever did, have quite as much faith in it, and believe any practitioner who does not cap pulps falls far short of his duty. The broaches my friend from St. Louis has brought here for several years to give away are very good, but not new or rare. I think for special cases those made of piano-wire better, owing to their being stiffer, and their resisting quality many times is a great advantage. I am surprised that my friend Ingersoll should claim that the apical foramen must be closed by nature with cementum, and that no case can be successful unless this occurs. It may be true that nature does this in many instances, but if the root is in good condition as to cleanliness, and well filled, I will warrant the success of the tooth, without nature depositing cementum and closing up the apical foramen.

Dr. Taggart, who opened this discussion, says he likes cohesive foil for cervical margins. I prefer non-cohesive gold or tin for the first half of these cavities, and, as Dr. Gardiner says, I object to retaining-pits at cervical margins, owing to the danger of splitting off a portion of the tooth. If made at all, they should be far enough from the edge to avoid this, but I much prefer an undercut or groove and

soft foil to start with, and finishing, if you choose, with cohesive foil No. 10 or 20.

Dr. Noyes. The propriety of saying that soft gold can be spread is questionable. Soft gold, however, can be wedged,—*i. e.*, given two pieces of soft gold in a cavity, a third pressed in between will spread them, surely.

Dr. Allport. The spreading or non-spreading of gold depends very largely upon whether the gold is cohesive or non-cohesive, as well as upon the shape of the instrument used in condensing it.

By virtue of the peculiar properties of cohesive gold as prepared for the dentist, it coheres or welds at its various points of contact, which prevents its many surfaces from sliding upon each other, rendering the mass stiff and unyielding, and giving it a tendency to draw towards the point at which pressure is applied and from the walls of the cavity. This tendency accounts for the leakage and decay so common around fillings made from exclusively cohesive gold. While by the absence of the cohesive property the points of contact in the foil do not cohere or weld, which allows the many surfaces of the mass to slide upon each other, thus lessening its tendency to curl up and draw away from the walls of the cavity under pressure. But neither cohesive nor non-cohesive gold will spread under pressure unless the blade of the instrument used in packing it tapers towards its point, or is convex upon its surface. If broad and flat upon its surface, the gold is carried directly before it and condensed without spreading, provided the surface against which it is packed corresponds to the plane of the point of the instrument.

Dr. McKellops. Is not all pure gold cohesive?

Dr. Allport. All pure gold is cohesive unless its surfaces are covered with foreign substances derived from the atmosphere or elsewhere.

Reference has been made to the difficulty of filling at the cervical margins without cracking the enamel. Liability to this accident depends upon the shape of the cavity at this point, the form and size of the instrument used in packing, and the amount of gold carried before it.

If the enamel has frail and overhanging walls, or the first piece of gold introduced or the points of the instrument are so small that the latter can pass through the former, or in any way come in contact with the tooth-structure, then the wall is very apt to be fractured. Therefore, at this point too great care cannot be taken

to have the wall of the cavity straight or with but a slight undercut, and the surface slightly countersunk, as a guarantee against fracture from pressure. Then, with a large pellet of non-cohesive gold, or gold and tin combined, as much as can well be carried into the cavity, and with a broad, flat-pointed plugger, to avoid the danger of forcing the instrument through the gold, with a few firm blows of the mallet the filling should be packed securely at the cervical margin, and then the operation can be completed with such other instruments as are best adapted to the individual case.

When gold and tin are combined, the tin should always be placed on the outside, for the reason that it is more readily adapted to the walls of the cavity, and for the additional reason that it can better exert the antiseptic influence, which experience and observation demonstrates that tin possesses in preventing a recurrence of caries, especially at this point.

Dr. Harlan. In the conduct of a dental practice the mistake is often made of having too many appointments per day, and in allowing them to follow one another too closely. You are also apt to permit yourself to be interrupted by persons who call to inquire your fee for giving gas, extracting teeth, or the cost of a plate, and thus time is wasted which properly belongs to a patient by appointment. This is an injustice to yourself as well as to your patient, and results from an absurd lack of system. There is no dentist, no matter how small the city is wherein he practices, who cannot reserve special hours for consultations. Be systematic.

In regard to pulpless teeth, their harmlessness has been questioned by the medical profession. My own experience is that medical practitioners as a rule are unable to distinguish between a pulpless and a live tooth, or between the temporary and permanent sets of teeth (molars especially), consequently their opinions cannot be considered exact.

Dr. Ames. In discussing the causes of the failure of gold fillings, electrical disturbances, incompatibility of filling materials, etc., have been enumerated, but I have come to the conclusion that the real cause of such failures can in most cases be traced to the exclusive use of cohesive gold. I have noticed that the defects do not appear at the cervical portion of large gold fillings, nor in contour work, but that they oftener occur with small fillings and at what were their most inaccessible points. I have modified my practice as to the form of gold most used, for it can be shown that in the use of a form the layers of which will slide upon each other it can be better

adapted to the walls of the cavity. By the use of non-cohesive foil inaccessible points in difficult cavities can be filled in until it is a cavity of simple form. Amalgam fillings fail because of the inclination of the material to resume the spheroidal form, thus leaving the cavity margins exposed.

Dr. Sitherwood. I agree with the position taken by the essayist in regard to pulpless teeth,—*i. e.*, I take special pains to explain to intelligent people *reasons why* in treating and filling pulpless teeth and other peculiar cases. On the other hand, there seems to be a field for work in teaching the physicians dental science. We owe them a duty as well as our patients in this direction. It is all a matter of education. I am in the habit of finishing all large gold fillings with platinized gold for mechanical reasons.

Dr. Ottofy. If it is possible I should like to get a proper understanding of the spreading properties of gold. Dr. McKellops says it does not, Dr. Crouse that it may be, spread. Dr Ames says that it cannot be, while Dr. Black says it can. Are they all aiming at the same thing in a different way? A non-cohesive pellet can be made to occupy a wider space as its particles glide over each other under pressure than can a cohesive pellet, which simply flattens down but does not "spread."

Dr. Reid. Ductility is a property of gold, hence it must be capable of spreading under pressure.

Dr. A. W. Freeman. Frequently pain and inflammation in the peridental membrane follow the application of even thin rubber dam about the teeth, some patients after short and simple operations complaining that their teeth ached all night. To afford grateful relief, immediately on removing the dam apply with a pellet of cotton the following solution on the gum entirely around the tooth:

℞.—Tincture of iodine, ♏xl.
Carbolic acid crystals, ♏vj.
Glycerine, ℥j.
Distilled water, ℥v.
Oil of Ceylon cinnamon, ♏v.
M.

Dr. Black. The spreading property of gold is dependent on the amount of force used. If one drop of water is added to another, they will roll and spread. A plumber, to fasten an iron bar into a stone, pours around its end in the hole molten lead, which shrinks in cooling, and the bar is then tightened by spreading the lead by blows of instruments similar to our pluggers, so that it is a mere

question of force. This same rule holds good in the working of gold.

Dr. Green. My idea is that the gold-beater uses a mallet weighing from four to six pounds, while the dentist's weighs only from four to six ounces, so that we probably do not use enough force to produce spreading.

As far as possible, I make my engagements from nine to twelve o'clock, and from one to four, reserving one hour at noon and one to two hours in the evening for the treatment of teeth, making examinations and appointments, etc. I very often find that the operation for which the three hours is reserved requires more time, and I can use the time between the engagements and avoid slighting the fillings.

Dr. Spalding. There is apparently a wide difference of opinion regarding the malleability or forging capacity of gold. Gold spreads under the force of the blows of a mallet, just as it and other metals spread in the act of forging. I mean that gold may be forged in the cavity of a tooth, provided the proper force is applied in the proper direction.

After packing a filling, if you are doubtful about the margin being tight at all points, just go over the surface of the filling with a suitably-shaped instrument, and you will find the gold can be readily driven against the wall-margin without injury to the tooth. This is not an opinion; it is a matter of repeated demonstration, and one that I constantly practice. The point of the instrument should of course be placed near the edge of the plug, and the proper shape of this point will suggest itself to every intelligent mind.

Dr. McKellops. It makes no difference whether we use cohesive or non-cohesive gold, but I insist that it shall be pure. I say that gold will not spread, and at the inaccessible point you cannot fill perfectly with non-cohesive. You must be able to see your way, what you are doing, and then you can fill the cavity with any pure gold. I have never used amalgam in all my practice, employing as a substitute the oxychloride or phosphate of zinc cements.

I do not agree with Dr. Black that the cervical margin should be cut square across, as he describes, but that it should be prepared U-shaped. If there is decay under a cusp, it (the cusp) should be cut away so that the cavity will be entirely accessible.

Dr. Taylor. In this cavity drawn by Dr. Black (a representation of a molar with caries under one of its cusps) you will have failures in spite of all you can do short of cutting away the cusp. In the

berry season seeds are liable to lodge in fissures and between cusps and split off a portion. Many fillings perfect in other respects are spoiled in this way.

Dr. Black. Each individual case must be studied by itself, and in order to obtain good margins to proximal cavities, I find they are oftenest cut square at the cervical margin. If cusps are frail, I cut them off. It is quite possible to spread gold up to an exposed margin, but I had rather drive it away still farther and put in the space a fresh piece. I want to place the gold against a wall and have it stay there.

Dr. Crouse to Dr. Black. What is your opinion of the practice of filling deep undercuts with plastics,—reducing such a cavity to a simpler form?

Dr. Black. I would rather cut away and fill, because we should thereby get a stronger piece of work. If we manage the case otherwise we never know how strong the part is, and after the loss of tissue by wearing the break which occurs is serious. When this variety attacks children's teeth, the overhanging portion is robbed of nourishment by the gradual wear until it becomes more and more brittle.

Dr. Crouse. There are good thinking men who say that disintegrated dentine seems to recalcify.

Dr. Black. Yes, you may leave such dentine over pulps, but it is not safe practice to leave it in undercuts. "*Seems* to recalcify" is evidently the proper term. My efforts to demonstrate such an occurrence have proved futile.

INFLAMMATION.

BY DR. C. W. SPALDING OF ST. LOUIS, MO.

The domain of medicine does not, perhaps, present a subject of more importance than that of inflammation; and yet it is one that at the best is but imperfectly understood. Inflammatory conditions precede, attend, or follow nearly all the diseases to which the human body is subject. The diseases that lie within the range of dental practice form no exception to this general rule; hence it is of the first importance that every practitioner of dentistry should be familiar with all that is known concerning the nature, origin and

effects of inflammation, and of the therapeutic means available for its cure or alleviation. This short paper has been written with a view of helping to more widely disseminate this knowledge. Of the causes which lead to the phenomena of inflammation there is scarcely anything known, nor are the methods discernible by which these causes produce their results; even the conditions present with, and which may be said to constitute, inflammation have only been partly determined. We have heat, redness, swelling, and pain, together with an exalted sensibility and impaired, deranged or suspended function; but these are only the evidences that an inflammatory state exists, and give little indication of the nature or causes of the disease. Not all of the symptoms mentioned are to be looked for at the same time in any case; but when any two of them are present they are to be accepted as an unmistakable sign of the inflammatory state.

In health the tissues are in a normal condition, the circulation of the blood is equable, and under the impulses of the nervous forces the organs of the body are discharging their respective functions in an orderly and proper way. Presently there comes a change. The circulation, local or general, is disturbed; the tissues take on an altered aspect, and the functions of one or more of the organs are interfered with, accompanied by pain, and perhaps other symptoms of disease. What has caused this change? We say inflammation is present, and the microscope has been resorted to for the purpose of ascertaining, as far as possible, the character of the changes that have taken place. This instrument reveals the fact that the first change observable consists of a slight enlargement of the blood-vessels contained within the inflammatory field. Arteries, capillaries and veins are all enlarged, and an increased movement of the blood takes place in all the dilated vessels. This increased movement is, however, of but short duration, for soon it is succeeded by a decreased movement, slower than normal. This slower movement is the first indication that has yet been observed of approaching engorgement. As a consequence of this slowing of the blood-current, an accumulation of blood-corpuscles soon becomes apparent in the capillaries and veins. This condition may continue and increase until complete stasis of the blood has become established. At the same time the corpuscles are diverted from their normal position in the center of the blood-stream, and become promiscuously mixed with the volume of blood. To this dispersion of the red corpuscles, together with the crowding, is due the increased redness of the parts. The white

corpuscles loiter along the inner surface of the vessels, and these protoplasmic masses soon throw out processes or projections from their globular surfaces. These minute projections penetrate the vessel walls, and presently the corpuscles appear outside of the vessels, having passed through interstices in the walls many times smaller than themselves. They are now called migratory cells or corpuscles, and this migration of the white corpuscles appears to be the initiatory step in the formation of pus. We now have true inflammation, which has passed beyond the hyperemic stage, and the changes which follow are only a more advanced stage of the same general process. If the disease is not arrested, the red corpuscles eventually follow the same migratory course as the white, passing, however, through the walls of the capillaries. It is the presence of these corpuscles that gives the red color to pus that is sometimes observed, and the red color of pus is in proportion to the extent of the migration of the red corpuscles. To allow of the passage of the blood-corpuscles through the vessel walls, some change must have taken place in the tissues of which the walls are composed. That there is a loosening of the cellular structure, resulting in the opening of interstices in the wall-tissue, there seems to be no doubt. This is the case whenever the white crpuscles pass through the walls of the veins, or the red corpuscles through the walls of the capillaries. Rindfleisch thus describes the process by which the red corpuscles make their way through the walls of the capillaries: "Small, roundish, sacciform elevations are seen projecting from the walls of the capillaries, whereat an outwandering of the red blood-corpuscles begins. They escape through the little crevices, which here enlarge to form real stomata, at the junction of the capillary endothelial cells." The structural form of the capillary walls is such as to favor the above described process, for although they are composed of a single, structureless membrane, this membrane is interspersed with elongated cell-nuclei, which are disposed with wide interspaces. The endothelial cells are also rounded at their angles of contact. In health the plasma passes the walls of the capillaries by osmosis, but the escape of the blood-corpuscles is by diapedesis; consequently we conclude that cellular modification takes place, by which interstices are opened or enlarged for the passage of the corpuscles.

If we now return to the slowing of the blood-current, and try to discover its cause, we are met by a condition of the vessels which would appear to be rather favorable than otherwise to an *increased*

flow. Instead of a constriction of the vessels, we find an expansion, and hence, so far as space goes, there is no mechanical obstruction to a normal flow. There is an accumulation of white corpuscles along the inner wall surface, and this has been held to be a means of obstruction; but to me this seems doubtful, for, unless there was already a slowing of the general current, there would be no accumulation of corpuscles, for the reason that all would be carried along with the general flow. Neither has there been discovered any change in the vessel walls, other than dilatation, that could either hasten or retard the normal flow. So I do not see but that we must regard all the changes shown under the microscope as symptoms or effects of the inflammatory state, and not as causes,—certainly not as primary causes. If we could determine what caused the dilatation of the vessels and the subsequent local slowing of the blood-current, we should be near the solution of the problem of inflammation.

It has been claimed that the alteration in the blood-vessels was caused by, or was at least coincident with, a diminished activity of the vaso-motor nerves, and that the dilatation of the vessel walls and the lessened cohesion of the elements of the wall-tissues were due to this cause. But the question at once arises, What has produced the lessened activity of the vaso-motor nerves?

The blood is the parent of the body. From it not only do the tissues derive the elements of growth and nutrition, but the forces which animate the organs come from the same source. The blood may, therefore, be described as a solution of the substances of which the body is composed, and of the organizing forces which construct the body from the amorphous materials present in the blood. Nothing, therefore, of either substance or force can exist in the body that did not pre-exist in the blood. If, then, as is claimed, the altered condition of the vessel walls is due to the diminished activity of the vaso-motor nerves, should we not look to the blood, the source of this nervous energy, for the cause of the lessened action of the nerves? This is, of course, only a suggestion; yet if we limit ourselves to that which appears under the microscope, we cannot go beyond the dilatation of the vessels. Beyond this we pass the limits of demonstration, and enter the region of hypothesis. But let us not lose sight of the fact that, broadly speaking, the physical world is not the world of causes; it is the world of effects. Hence the cause or causes of inflammation, like the causes of many other diseases, may ever elude microscopical research, and may never become visible to physical sense. In that case we must either

content ourselves with that which is demonstrable to the senses, or we must resort to hypotheses for the solution of the undemonstrable problem. A sound hypothesis is tenable far beyond the limits of demonstration which exists at any particular period in the history of science. The theory of gravitation was held long before Newton demonstrated the existence of the law. So, when the eye of sense fails us, we must either stay our progress or resort to the eye of reason to guide us on our way. If the blood is the life,—the physical life,—and contains the substances and the forces which build up and animate the animal body, where else than to the blood shall we look for the causes of those changes which are known to take place in the blood and in the tissues, and which constitute the condition known as inflammation? I do not attempt an answer to this question. I am propounding, but leave it for the future to solve.

Before leaving this branch of our subject, I wish to say that I regard the circulation of the blood as the most remarkable phenomenon of animal life, just as the circulation of sap is the most remarkable phenomenon of vegetable life. Any alteration in the circulation of the blood, except in cases of lesion, it seems to me, must be due to causes beyond the reach of present microscopic investigation. The phenomenon of blushing, which is wholly due to mental causes, exhibits one of the symptoms of inflammation; while the opposite state—that of pallor—shows how from some affection of the mind the blood leaves the surface and crowds upon the heart.

Inflammation is generally divisible into two kinds, viz., inflammation of repair or restoration, and destructive or disorganizing inflammation. The one is regarded as the friend and the other as the foe of mankind. The question here arises whether these processes are identical in their nature, differing only in degree, or whether there is an essential difference in the processes themselves. That the results are opposite is well known, and where the results vary so widely it is natural to look for essential differences in the processes. One terminates in resolution or delitescence, and the other in ulceration, gangrene and mortification. The only difference now known to exist in the processes is one of degree. We have here an illustration of the near relation that exists between physiological and pathological processes, the dividing line in this case being difficult to define. In the reparative process it is probable that the wandering corpuscles, or many of them, undergo metamorphosis into connective-tissue cells, and become incorporated into the structure of cicatricial tissue; although this tissue is largely

composed of stable connective-tissue cells, which are not derived from this source. The corpuscles that do not undergo metamorphosis will be spoken of further on.

Another feature of interest is the extension of inflammation. If not arrested, we know it spreads. How does this extension take place? That a prominent means of extension exists in the blood, especially in the blood that has passed through the inflammatory tract and reached the veins, seems quite clear. That extension is also due to sympathetic nervous action, as in the case of the mammary glands and the uterus, is quite as evident; although in this case no direct nervous connection can be traced. There may be other ways in which extension takes place into adjoining tissue, as by continuity and contiguity of structure, or by the lymphatics; but I regard the first two mentioned as the chief agencies.

Let us now consider another phase of our subject, viz., some of the sequences of inflammation. The formation of pus is a common result, and one which we often encounter. How is pus formed, and of what is it composed? Pus contains blood-corpuscles, exudate as distinguished from corpuscles,—that is, fluid exudate,—and degenerate or dead tissue-cells. So long as this exudate, which inundates the surrounding tissues, and which is said to differ somewhat in its composition from the plasma of the blood, does not accumulate as a constituent of pus, the alteration which it undergoes does not seem to be sufficient to prevent an innocent return to the general circulation. As to the corpuscles, if they remain in their embryonal state, rapid proliferation is likely to take place, and the excessive number resulting from this process, and which do not undergo metamorphosis into tissue-cells, are to be regarded as foreign elements. Excessive multiplication therefore tends to accumulation, which condition favors the formation of pus.

The fluid exudate commonly but erroneously called serous is also liable to accumulate and undergo chemical change. Both these processes, excessive proliferation and chemical change, may at an early stage of the inflammatory process be greatly retarded, if not wholly arrested, by the external application of cold,—cold having the effect of checking proliferation and chemical change. Cold is applicable during the "accession" period of inflammation,—that is, during hyperemia and before congestion has taken place. During congestion, and especially when stagnation is present and stasis imminent, cold has not only lost its curative power, but has become positively injurious. So far as a change of temperature of the parts can be

made useful in this stage, heat is the appropriate remedy. Heat combined with moisture is therapeutically indicated in the external or local treatment of passive congestion. I, however, regard all external treatment of inflammation as auxiliary only to the more potent one of internal medication. It is not my purpose at this time to detain you with a detailed description of the therapeutic means available in the treatment of this affection. To do so would be to prolong this paper far beyond its prescribed limits. I only propose to briefly point out a few of the general principles which should regulate the choice of remedies, for the reason that the principles governing the treatment of inflammation in the general system are not essentially different from those which are applicable to the specific tissues and organs that come directly under our care. I can see no reason why an inflamed tooth-pulp should not be treated according to the same therapeutic laws that are applicable to a similar condition, in a similar tissue, in any other part of the body. To help us to a more clear understanding of the therapeutics of inflammation, I must be allowed to call your attention to the phases or conditions through which inflammation passes. First, we have to deal with a state of excitement or exaltation, known as the hyperemic stage. This is followed by congestion of the blood-vessels, which if allowed to continue soon runs into stagnation and blood-stasis. The third stage of the process is one in which degeneration, disorganization, and structural change take place, and which, if not arrested, will ultimately result in devitalization and decomposition of the tissues involved, and molecular death.

The specific remedy for the first of these conditions is aconite. But if the disease has passed beyond the hyperemic stage, aconite is no longer useful, or if administered at the right stage, and the disease is only partly relieved, it must be followed by arnica, belladonna, and their analogues, such as bryonia, magnesia phos., etc. These latter are applicable in the second stage. In the third stage, when destructive processes are threatened or are actually in operation, mercurius is the leading general remedy. There are a number of intermediate remedies which may be preferred when the conditions are such that neither of the distinctive remedies is clearly indicated. Some of these are antimonium crudum, hepar sulphur, silica, etc. The successful employment of the medicines named, and others in close relation to them, can only be acquired by a thorough study of materia medica, so as to enable one to recognize the picture presented by the pathognomonic symptoms

which legitimately belong to each drug. We can then say with confidence this is an aconite case, or an arnica case, or one calling for antimonium crudum, hepar sulphur, magnesia phos., coffea, silica, mercurius, or some other appropriate remedy.

Nothing new has been attempted in the preparation of this paper, but only the collection and arrangement of a few generally accepted facts, and the presentation of some familiar ideas, for the convenience of those who are interested in the subject. I have been animated by a desire to contribute something towards the diffusion of knowledge upon this subject; to cast in my mite in aid of the alleviation of human suffering, by pointing out some of the conditions present, and the agencies that may be employed to that end, and thus to help to stay the popular demand for the unnecessary and unwarrantable destruction of human teeth.

Discussion.

[Opened by Dr. G. V. Black.]

Dr. Black. To discuss the subject of inflammation briefly is a difficult task. I will therefore endeavor to limit my remarks to one or two points. There is no field of pathology in which greater advance has been made within the last few years than this. It has been but a little while since investigators were limited to the examination of the transparent membranes in the living subject, and the study of sections taken from the dead. In the latter case nothing could be seen of the active processes,—nothing but results ; and in the former the observer was practically limited to the initial stages of the process, such as the accompanying hyperemia, stasis, and the outwandering of cells from the blood-vessels. With these processes the membranes became so clouded and thickened by the outpouring of the exudates, that the more important processes or changes that were going on in the fixed cells of the part could not be seen. For these reasons, too much importance was given to the emigration of leucocytes from the blood-vessels, and a school of pathologists arose, under the leadership of Cohnheim, who seem to have regarded this as constituting about all there was of the process; who regarded the tissues, the blood-vessels, and the fixed cells of the part as passive,—as in a state of paralysis, and taking no part in the proceedings. Other modes of study have been instituted, notably by Stricker, who has been followed by Sanderson and others, by which changes of the cells of the part that were before in a fixed condition have been observed. These studies have been carried on

mostly in the tissues of the cornea of the eye. By excising this, in the cold-blooded animals, and keeping it constantly irrigated with the serum of the animal from which it is taken, it may be kept alive for a considerable time, and the cellular changes followed as they occur. In this mode of study the cells that before were fixed and motionless have been seen to take on amœboid movements, and finally to break up, forming amœboid cells. In this way the tissues are melted down,—if the process is sufficiently severe,—pus being formed by this breaking up of the fixed cells of the part, assisted by the aggregation of the wandering cells to the focus.

But these cells do not necessarily go to the formation of pus. Whether they do or not depends mostly on the grade of the inflammatory process, or rather upon the conditions to which the cells are subjected. If, because of unfavorable conditions, the cells sink so low in the scale of vitality that they may not recover, they are thrown off as pus cells; but where the conditions are better they develop into connective-tissue cells, and go to reform the injured part, —are built into tissue of repair. It therefore happens that in the repair of wounds some cells that are favorably placed are being formed into granulations,—young connective-tissue of repair,—while others just like them, but less favorably placed, are being shed off as pus cells.

In the study of the processes of repair, Ziegler has assisted greatly by his scheme of immersing bits of glass in the tissues. I have made these in this way: Take two cover-glasses, such as are generally used for covering microscopic objects; lay them together in the grasp of a pair of foil-pliers, and hold the margins in the flame of a Bunsen burner until they are united by the melting of the glass; then turn the opposite edges and melt them together in the same way,—all this time holding the flat sides of the glass together with the pliers. There is no danger of getting them too close together. This is laid in a wound, and the slight space between the glass is filled with serum, and the amœboid cells will creep in also, and in this position go on developing into tissue. These may be removed and examined at stated times. It is only necessary to stick them on to an ordinary glass slide with glycerine jelly, and they are ready for examination. The specimen is literally grown ready mounted. By this mode of study much has been added to our knowledge of the processes of the building of tissue of repair.

A word now in regard to chronic inflammation. But, first, what

is the cause of inflammation? *Tissue injury*, always. This may occur in a multitude of forms, as from violence from without, mechanical irritants, chemical irritants, micro-organisms, poisons circulating in the blood, and a thousand other things. All are expressed in the two words, *tissue injury*. Now, in what we know as chronic inflammation there is some cause that continues to act. Inflammation is the expression of resistance under injury, and if there is constantly present some cause of injury the inflammation will persist until that cause is in some way removed. In some cases, however, the blood of the patient may be so poor in quality that repair fails from the want of proper nourishment of the tissues. Whatever the cause may be, it must be found and removed, if we wish for repair. If it is a local irritant, it must be removed. If it is micro-organisms, they must, if possible, be destroyed, or rendered inert for the time by the use of antiseptics. If the blood is too poor to support the efforts at repair, it must be improved by the judicious use of appropriate remedies.

Hyperemia is not inflammation. It is an independent condition, but it usually precedes and accompanies inflammation. We may, however, have violent hyperemia of a part without inflammation, Simple hyperemia of the tooth's pulp is an exceedingly troublesome affection. Exacerbations will occur with every change of temperature, and unless the tooth is well-protected it is liable to grow worse and worse until the blood-vessels are broken down and the pulp destroyed.

President Townsend. Can you define or give the difference between hyperemia and congestion?

Dr. Black. The words are often used interchangeably, but congestion is more properly used to designate a condition of over-filling of the veins because of an obstruction of the flow of blood *away* from the part, while hyperemia is more properly a condition in which too much blood is admitted to the part by the arteries, or a condition in which too much blood flows through the part.

President Townsend. Do you not find that chronic inflammation and chronic suppuration continue after the removal of the causes?

Dr. Black. No, sir. Suppose there is an injury to the hand. The case may not heal after the stick or the knife that made the wound is gone. Micro-organisms may remain; the blood of the patient may be too poor in quality to support the efforts at repair; various causes may persist as substitutes for the original cause, but if all these be removed the case will progress toward recovery.

Dr. Ottofy. We have been taught that inflammation is manifested by the four symptoms of heat, redness, pain, and swelling. Is it possible to have a true inflammation without the presence of all these symptoms?

Dr. Black. Yes, sir; it can take place and none of these symptoms be present. Anyone will be able to differentiate hyperemia, which is an enlargement of vessels from inflammatory migration of cells.

Dr. Brophy. Then in active hyperemia we are to understand there is no migration of blood-disks.

Dr. Black. There is no migration in physiological hyperemia, but there is in pathological hyperemia. We then have an escape of the red blood-disks into the tissues.

Dr. Brophy. Some writers regard the migration of the leucocytes as an essential part of inflammation and a help to it. For instance, in union by first intention the life of the cell is not lost, but enters into the formation of new tissue.

Dr. Ingersoll. Different authors use the term *inflammation* in different senses. This gives rise to great confusion in the study of the subject. Burdon Sanderson defines inflammation to be "the aggregate of those results which manifest themselves in an injured part." Stricker says, "Inflammation manifests itself in two features, —an active hyperemia, and an active tissue metamorphosis;" thus confining his statement to the earliest and the latest of the manifestations constituting the *aggregate*, according to Sanderson. In naming these two he must include all intermediate results. Others use the word in a much more limited sense, applying the word to a single stage in the progressive processes of inflammation. Again, Stricker and Cohnheim are at variance concerning the origin and development of pus-corpuscles. Stricker believes them to be proliferations of the connective-tissue bordering the inflamed area; while Cohnheim believes them to be emigrants from the blood. We may reconcile the opposing views by considering the inflammatory processes as both destructive and reconstructive. The emigrants are representative of the one; the proliferations of the surrounding tissue are representatives of the other. Thus the two warring champions are both right. Dr. Black thinks that pus is not a sequence of inflammation. Using the word, as I have, in a limited sense, I think it is. Again, I may use the word in the expanded sense given by Sanderson; for I consider inflammation to be, not a simple condition, but a series of conditions each the resultant of the

preceding. When we find such differences among writers in the use of language, terms should be defined to avoid confusion of ideas.

Dr. Black. One form of hyperemia of course usually precedes inflammation. Severing the splanchnic nerves produces a hyperemia which does not lead to inflammation.

Dr. Spalding. Dr. Black seems to have misunderstood me. I was speaking of the *causes* of inflammation which may lie beyond the range of microscopical research, and not of the facts which have been revealed by the use of the microscope. The processes of inflammation result from the action of physiological forces, the resulting conditions, whether of growth, destruction, or metamorphosis, may be observed under the microscope; but these latter are not causes.

The ground is taken that there is no difference between the formation of pus and cicatricial tissue. I do not so understand the processes. Cicatricial tissue is organized, which cannot be said of pus. Dr. Black makes a distinction between leucocytes and pus corpuscles. This may be a late discovery, but my study of the subject has led me to regard them as identical until the pus-corpuscle undergoes decomposition. The presence of white corpuscles outside the blood-vessels is evidence of a call for restorative effort; if they are in excess and accumulate, pus results.

NOTES ON NEW REMEDIES.

BY DR. A. W. HARLAN OF CHICAGO, ILL.

The permanent additions to dental materia medica are coming but slowly to the front. The reason is obvious, as all practice must, in the first instance, at least, be more or less empirical. The more recent new drugs and compound substances introduced into dental practice may be catalogued in very short space,—peroxide of hydrogen, iodide of zinc, eugenol, sanitas, corrosive sublimate (not new but applied for a new purpose), aconitia, chloride of aluminum, fluid extract of tonga, calcium sulphide, sulphate of gelseminum, boroglyceride, eucalyptol, iodoform, chinolin tartrate, menthol, naphthaline, terebene, cannabin, cocaïne, pheno-resorcin, resorcin, and a few others, which it is not necessary to enumerate. All of the above-mentioned substances have been investigated more or less,

principally by medical practitioners; but I am happy to state that not a few have passed their crucial tests in the beginning by practicing dentists. Your attention is solicited for a brief consideration of the properties of resorcin, pheno-resorcin, cocaïne, cocaïne-hydrochlorate, and a combination of hydrogen peroxide and an aqueous solution of corrosive sublimate.

Resorcin, $C_6 H_4 (O H)_2$, and pheno-resorcin:

Witthaus ("Medical Chemistry"): "Resorcin. Colorless prismatic crystals; fusible at 110°; boiling at 270°; obtained by the action of potash on galbanum, assafetida, etc."

Stocken ("Dental Materia Medica"): "Resorcin. The following advantages over carbolic acid are claimed for it: more soluble in water, almost destitute of odor, less irritating, and its toxic action slight."

Bloxam ("Chemistry," fifth edition): "Resorcin, $C_6 H_4 (O H)_2$, is a very soluble crystalline phenate, obtained by distilling the extract of Brazil-wood, or by the action of sodium hydrate upon benzine-disulphonic acid, obtained by the action of sulphuric acid on benzine."

Edes ("Therapeutic Handbook of U. S. Pharmacopœia"): "Resorcin. * * * It is closely related to phenol, and is, like it, a powerful antiseptic in the proportion of one to one hundred. It is soluble in all the ordinary solvents except chloroform and sulphide of carbon. * * * It has, of course, the great advantage over carbolic acid of much less toxic properties. Externally it may be used for all the surgical purposes of carbolic acid, and is preferable to it on account of absence of odor, of danger of poisoning, and its solubility in any proportion of water."

Lewin ("Incidental Effects of Drugs"): "Resorcin. If two or three grammes (gr. xxx. to xlv.) of resorcin are administered in solution or in substance, an effect is manifested in a very few minutes. There appear giddiness, buzzing in the ears, and an increase in the frequency of pulse and respiration. The face is reddened, and the eyes become brilliant, the patients being in a condition resembling intoxication. They are sometimes delirious, and manifest hallucinations; speech is stammering, and slight convulsive tremors appear in the hands."

Biddle ("Materia Medica"): "Ammoniacum Resorcin * * * is obtained from the resin "(galbanum). "From the resin are obtained *umbelliferone* and *resorcin*."

Bartholow ("Materia Medica and Therapeutics"): "Resorcin (not officinal). *History.*—Resorcin is a chemical compound discovered by

Hlasiwetz and Barth, and was obtained from certain resins by the action of fusing alkalies. They assigned to the new compound the name *resorcin*, partly because it is derived from a *resin*, and partly because it has some similarity to *orcin*, a peculiar substance obtained from orchil. Subsequently resorcin was constructed synthetically by Körner, and at the present time it is obtained in various ways, the product being both pure and cheap (Andeer). *Properties.*—Resorcin is a member of the phenol group. It occurs in tabular prismatic crystals, rather shining and lustrous; somewhat sweetish to the taste, with a little after-pungency. * * * In odor it is somewhat like phenol, but not nearly so pronounced. It is freely soluble in water, in the proportion of 86.4 parts of resorcin to 100 parts of water at 0° C. It is dissolved by all liquids except chloroform and carbon sulphide. * * * Albuminous liquids, treated with a concentrated solution of resorcin, become turbid by the formation of an albuminate of resorcin. * * * The dose for usual purposes ranges from five to fifteen grains. For a decided antipyretic effect a drachm may be given, but this amount could not be frequently repeated. Five grains may be given every two hours in an ordinary case. *Physiological Action.*—Resorcin does not irritate, nor is it absorbed by the unbroken integument. The solution, injected into the subcutaneous tissues, produces but little irritation, and never inflammation and abscess. Applied to the moistened mucous membrane, it causes vesication, and a white blister forms like that from carbolic acid (but not so severe). It has decided anti-ferment properties, arrests decomposition in animal tissues, deodorizes, and is destructive of the minute organisms on the presence of which putrefactive decomposition is dependent. A one per cent. solution will prevent the decomposition of urine when exposed to the air for months (Andeer). Applied to unhealthy wounds, it arrests decomposition, destroys the fetor, and promotes healthy cicatrization (Du Jardin-Beaumetz). * * * The elimination of resorcin takes place almost entirely by the urine * * *; the greater part absorbed is excreted in an hour. *Therapy.*—Resorcin, having much less irritating property, is generally preferable to carbolic acid for internal and subcutaneous use. * * * It has been used with great success, locally, in *syphilitic* and other sores of an unhealthy and sloughing character. Its solution may be applied as spray in affections of the nose and throat, *catarrhal*, *ulcerating*, or *specific*. Andeer affirms that, applied in crystals or in powder, it is the most efficient remedy in *diphtheritic* affections, and he has employed it with equal success in

anthrax. * * * Pheno-resorcin, carbolic acid and resorcin, sixty-seven parts of the former, and thirty-three parts of the latter,—this mixture crystallizes by cooling, and on the addition of ten per cent. of water becomes a liquid which mixes with water in all proportions."

Prosser James ("Therapeutics, Respiratory Passages," etc.): "Resorcin * * *, being a disinfectant externally, two to ten per cent. solutions are used, and these are not irritant, although resorcin itself is a caustic. * * * The taste being somewhat pungent, it should be well diluted."

J. M. Bruce ("Materia Medica," etc.): "Resorcin. Action and Uses: Externally, resorcin is antiseptic and disinfectant without being irritant. In ordinary solutions (two to ten per cent.) it has been used as a dressing for all kinds of sores and wounds."

To the above extracts from standard authorities I can add the following: Crystals of resorcin, applied to fungous growths of the pulp or gums, will destroy them after one or two applications. Foul-smelling discharges are rendered odorless by the application of five per cent. aqueous solutions of resorcin. Instruments are disinfected by being dipped in such a solution. I have injected ten per cent. solutions into sinuses leading from necrosed bone with excellent results. Weaker solutions have been very efficient as injections into pyorrhea pockets. As a disinfectant for foul mouths and ulcers in the mouth, it is a very pleasant and perfectly reliable drug. With the assistance of Dr. L. L. Davis, of Chicago, the following experiments were made to show its effects on bacteria. Experiment one: Stagnant water from the roadside maintained at a temperature of 70° F. for six days. To one drop placed on a slide, and a hair interposed between it and the cover-glass, was added one drop of a solution of resorcin gr. ii. to aq. dest. ℥ cxx. The rod-shaped bacilli in the drop of water were very lively at first, but in a few minutes their motions became slower, until in eighteen minutes all motion ceased. Moderate heat and the addition of distilled water failed to revive the organisms. Experiment repeated with the same result. Experiment two: Infusion of banana skin five days old; same temperature; solution of resorcin gr. v. to aq. dest. ℥cc. In thirteen minutes all motion ceased; life extinct; failed to revivify the organisms. Experiment three: Hay infusion eleven days old; same temperature; solution of resorcin gr. x. to aq. dest. ℥xc. In six minutes all motion ceased; life extinct; could not be revivified. All of the above and other experiments were con-

ducted under the microscope, and the organisms magnified 360 diameters. Experiment four: Infusion of prairie-grass, straw, various seeds, grains of wheat, sea-fern, bits of meat, melted snow, stagnant and hydrant water, 65° to 75° F., six months old. Pheno-resorcin one hundred parts to aq. dest. ten parts. The organisms at the edge of the cover-glass ceased to move in thirty seconds; those nearer the center became motionless in ten minutes; they could not be revived. Experiment repeated, with same result. Experiment five: Same infusion; solution of pheno-resorcin one in three hundred; the bacterium lineola ceased all motion in one hour and ten minutes; the rotifers in one hour and fifteen minutes; they could not be revived. Experiment repeated; same result. Experiment six: Same infusion; eugenol minims one; alcohol ninety-five per cent., ♏. xlix.; life extinct in five minutes; could not be revived. Experiment seven: One minim of the above was added to ♏. xxv. of aq. dest., and then one drop was added to the same infusion under the cover-glass, and in twenty minutes all motion ceased; failed to restore vitality or movement. The absence of odor and the freedom from irritating properties of resorcin will render it a valuable injection for fistulous abscesses. Aqueous solutions of resorcin may be used in the treatment of engorgement of the antrum, catarrhal or otherwise. The crystals may be applied to syphilitic patches on the oral mucous membrane, with certainty of the best results. An agreeable disinfecting mouth-wash may be made by prescribing:

℞.—Resorcin crystals, ʒ ii.
Thymol crystals, gr. xx.
Rose-water, q. s. ad., f ʒ viii.
Dilute to suit.

Solutions of resorcin in eugenol, eucalyptol, cinnamon, and other oils may be made in all proportions. Pheno-resorcin, to which has been added ten parts of water, painted on the surface of a forming abscess, will prevent a patient from feeling much pain on the application of a bistoury or lancet. Pheno-resorcin is more caustic than resorcin, and is a better obtunder of pain than the latter. I have not made sufficient clinical use of it to further state its good qualities.

Cocaïne—C_{17} H_{21} N O_4. Cocaïne Hydrochlorate: Almost every specialist in medicine has used some form of cocaïne since the discovery of its local anesthetic property by Köller less than a year ago. From my own use of the various preparations since the middle of October last, I am able to offer the following: The two and

four per cent. aqueous solutions are not useful in obtunding sensitive dentine, even after repeated and prolonged application to superficial or even deep-seated cavities. A ten per cent. aqueous solution is of some value as an obtunder of sensitive dentine after bathing the cavity for ten minutes or longer. The two and four per cent. solutions, applied to an exposed pulp (not inflamed), will produce anesthesia in from eight to fifteen minutes. The same solutions applied for thirty minutes or longer to an inflamed or congested pulp produced no effect whatever. Aqueous solutions painted on the gums before the adjustment of the rubber dam, or the application of a clamp, are uniformly successful. I have injected one to two drops of the four per cent. solution into pyorrhea pockets, and after waiting five to eight minutes have removed deposits and scraped the edges of the alveoli with comparative ease; but never succeeded in getting a patient to acknowledge entire freedom from pain. Six, eight, and ten per cent. aqueous solutions have not been more efficient in such cases. The aqueous solutions painted on the gums inclosing a forming alveolar abscess have not proved uniformly successful in the prevention of pain from cutting with a bistoury or lancet. The five per cent. oleate of cocaïne I have used since its first introduction. It is more efficacious for use prior to opening an abscess. For sensitive dentine it appears to be too feeble for general good results. I have not used it on a normal pulp. A ten per cent. solution of the hydrochlorate in eugenol is the best preparation for sensitive dentine that I have used. In very superficial cavities it requires from ten to twenty minutes to be effective; in moderate-sized and deep cavities I wait five minutes, and begin cutting while the cavity is flooded with the solution. In many cases the patients have stated that no pain was felt, even when a retaining-point was being drilled. I conclude that eugenol is the best solvent for the hydrochlorate in all proportions when it is desired to obtund sensitive dentine. Stronger solutions in eugenol at present do not appear to be more effective than the ten per cent. solution. I have been experimenting with solutions of the alkaloid in eugenol, but these are so recent that I have nothing definite to say on that point. A ten per cent. solution of the alkaloid in ether appears to be the best solution for application to an inflamed pulp when it is desired to extract it. You are all aware of the difficulty of extracting a pulp after devitalization with arsenic, especially when it is attempted within a day or two after the application has been made. The rapid evaporation of the ether appears to assist, by refrigeration, the anesthetic action of

cocaïne, and in most cases the pulp may be removed with a broach in from one to two minutes. Apply it with a dropper or a pipette, or on cotton. Stronger solutions in ether are not more useful than the above. My experience has been limited to the extraction of three teeth with the aqueous solution of hydrochlorate of cocaïne. In each case I used the four per cent. solution. The experiments were not entirely satisfactory to either of the patients. I extracted one upper molar root by using the oleate, and the patient experienced about as much freedom from pain as though the gums had been painted with water. I do not believe that our present knowledge of the various solutions of the alkaloid, hydrochlorate, citrate or other salt justifies us in promising to extract a tooth painlessly by using it, even when injected hypodermically. To sum up my experiences with cocaïne would be to say that we have one more drug which need not become dangerous in the hands of the empiric, and which has already proved itself indispensable to the dental surgeon in many ways that I have not touched upon.

Peroxide of hydrogen, one part, and aqueous solution corrosive sublimate, one in one thousand, one part, in a securely stoppered bottle, covered with dark paper, and kept in a cool, dark place, is recommended for use as an injection into a blind abscess or pyorrhea pockets for cleansing the débris, and as a potent germicide where such is needed. According to Pasteur, living organisms are of two classes,—those which must have oxygen (ærobic) to sustain life, and those which are instantly destroyed by oxygen (anærobic). In the above combination we have a compound or mixture which is fatal to both forms of putrefaction producers. A few months' clinical use of this combination has satisfied me that in the beginning of the therapeutic treatment of cases of pyorrhea we may expect to destroy the living organisms in the pockets, and also the spores, as microscopical experiments have disclosed. This combination of germicides is useful for cleansing a furred tongue, removing sordes from the teeth, disinfecting instruments, and as a primary injection into wounds made by the surgeon on alveolar processes for cleansing the débris. It may be used as a dressing for a root-canal, but when sealed therein with soft gutta-percha two or three perforations should be made through it to permit the escape of liberated oxygen or other gases. Experiment one: Infusion of prairie-grass, straw, various seeds, grains of wheat, sea-fern, bits of beef, and other articles were placed in an open-mouthed bottle, and covered with stagnant water from the roadside; after a time melted snow

was added; then, as the water evaporated, hydrant water was added; this was maintained at a temperature of from 65° to 75° F. for six months; one drop of the infusion was placed on a slide, the cover-glass adjusted by interposing a hair between it and the slide, and, while my assistant added a drop of equal parts of $H_2 O_2$ and one in one thousand of the aqueous solution of bichloride of mercury, I noticed its effect on the organisms in the field of the microscope. In less than thirty seconds all motion ceased. The most conspicuous organisms in the infusion were bacteria lineola and rotifera. Experiment repeated with same result. Moderate heat and the addition of distilled water failed to revivify the defunct bacteria. Experiment two: Same infusion; $H_2 O_2$ one part, and solution of corrosive sublimate one in two thousand, one part; experiment performed in the same manner as above. All motion ceased in eight minutes. Experiment repeated with same result. Moderate heat and the addition of distilled water failed to revive or cause any voluntary motion whatever. The conclusions to be drawn from the above experiments are so obvious as to need no comment. The propriety of transferring the micro-organisms acted upon by the above solutions to sterilized fluids or solids to demonstrate that the spores of the various organisms present in the infusions examined were also destroyed, has not been lost sight of, as experiments of that character are now being conducted which, it is believed, will show that in every case the solutions used were sufficiently potent to present the development of spores.

Discussion.

Dr. Marshall. In regard to cocaïne, I may say that when I first tried to obtain the drug Foucar's was the only kind to be had. Its strength was two per cent., and the results on the whole were very unsatisfactory. Afterwards I obtained Merck's ten per cent. and twenty per cent. solutions, which I applied first to sensitive dentine. My experience in using it was not satisfactory. The first case upon which I used it was entirely successful, but afterwards the results were very *uncertain*. In some cases I could get no effect whatever from the twenty per cent. solution. The application of cocaïne in the treatment of pyorrhea alveolaris was more satisfactory; at any rate, patients would say that the pain was mitigated.

Dr. Sarah Hackett Stevenson said, in a letter published in the *Journal of the American Medical Association* at this time, that the citrate was, according to the opinion of Merck, a more efficacious

preparation for use by the dentist. I telegraphed for Merck's, but failed to obtain it. McKesson & Robbins kindly offered to prepare a sample for me, which I received in due time, but we found that the citrate could not be kept in solution longer than three or four days. I therefore had a druggist make some citrate pellets for me, using gum tragacanth and glycerine for the excipient, containing one-quarter of a grain of citrate of cocaïne each, which proved to be more than was necessary. I reported ten cases in which the citrate was successfully employed to obtund sensitive dentine and to remove pulps painlessly.

Messrs. McKesson & Robbins sent me specimens of the five per cent. oleate and the normal oleate. I had no better success with the five per cent. oleate than with the two per cent. solution of the hydrochlorate. The normal oleate (strength forty-eight to fifty-two per cent. of the alkaloid) produced little effect on the pulps. I experimented upon dispensary patients, and could cut the gums with a bistoury without the patients' knowledge. In extracting abcessed roots after its application there was as much flinching as ever.

Our next case, one of odontalgia, was a complete failure, but in the treatment of pyorrhea alveolaris it was completely successful in controlling the pain. The manner of applying the citrate pill is as follows: Place a pill in the cavity and cover it with a pledget of cotton previously moistened in tepid water. The excipient soon dissolves and flows over the cavity. The cavity should be freed from loose débris before the drug is introduced. Anesthesia is produced in from five to twenty minutes. I had one complete failure in the case of an inflamed pulp.

Dr. Black. Have you used the hydrochlorate in the same form (pellets) as you use the citrate of cocaïne?

Dr. Marshall. I have not, but the hydrochlorate or alkaloid produces less pain than does the citrate, which, from the presence of the glycerine, causes a sensation in the tooth similar to that produced by bibulous paper or the introduction of the oxychloride of zinc.

Dr. Martin. How long does the anesthesia last?

Dr. Marshall. Long enough to complete the excavating of a cavity. Once I found anesthesia to continue an hour.

Dr. Black. I obtained the best results by using the pure alkaloid, placing it in the cavity dry and adding a little water.

In preparing the solution of mercuric chloride in hydrogen peroxide, it is best to dissolve the bichloride in the peroxide itself, a grain of the former to an ounce of the latter making a solution of one part in four hundred and eighty.

Dr. Gilmer. Some time since, in conversation with a physician of Quincy on the subject of antiseptics, he recommended a combination of equal parts of carbolic acid crystals and camphor. The addition of a little mucilage prevents the formation of fungus.

Dr. Rohland. In the first experiments with cocaïne it was applied only to the part directly at the point where its effect was needed. I have had better success in applying it over a larger surface: My method of using it is to inject a few drops either of the oleate or aqueous solution into the gum at the alveolar margin with a hypodermic syringe, after having first rubbed a little on the surface of the gum.

Dr. Marshall. Would you get any pain from the application of hydrochlorate of cocaïne?

Dr. Black. Not any, sir.

Dr. Marshall. Can you explain why we have this short period of stinging pain after applying the citrate?

Dr. Black. I suppose it results from the absorption of moisture by the drug.

Dr. Gilmer. I have been unsuccessful in the use of cocaïne at home, but in the clinic to-day I used a ten per cent. oleate with very happy results.

Dr. Cormany. I can testify to the efficacy of cocaïne and eugenol in combination. Five minutes after applying the above in a sensitive cavity in my own mouth it could be operated on without pain. I have also found the fluid extract of cannabis indica very efficient in allaying sensitiveness at the margin of the gum.

Dr. Taylor. In many cases when a cavity has been perfectly dried it is rendered non-sensitive.

Dr. Black. May there not be an element of anesthesia in the dentist's tongue?

Dr. Magill. My experience with cocaïne is very satisfactory. I allow it to remain in place five minutes before operating.

Dr. Woodward. The pain produced was so frightful that I used it but once.

Dr. Green. In a case where it was applied to a sensitive labial cavity of an incisor it had a very marked anesthetic effect. In another case it was successful only after waiting half an hour.

Dr. Marshall. I have made some experiments with the hydrochlorate of cocaïne in this direction, and find that by drying the cavity with hot air and applying the cocaïne the result was more satisfactory; also, that by trying the hot air alone the result was quite

as marked. Using the two methods separately in the same mouth, I found the hot air equally as efficient as the hydrochlorate of cocaïne. The citrate is much more reliable as an obtunder of sensitive dentine than the hydrochlorate, the oleate, the hot-air blast, or either combined with the hot air.

Dr. Duncan. Has anyone had experience with Robinson's remedy?

Dr. Swain. I have experimented with Robinson's remedy with excellent results. I think there is enough good in it to warrant us in giving it a fair trial. I only partially dry the cavity. The pain is less, it seems to me, perhaps because the water present dilutes the remedy. In the case of a young girl recently treated, whose teeth were soft, sensitive, and rapidly decaying, I was enabled to make the necessary operations with comfort to both the patient and myself. No one of these agents is successful in all cases. A few drops of glycerine added to Robinson's remedy will make it easier to handle.

Dr. Cushing. We seem to be seeking a panacea. Dr. Swain has made a good point in saying that no remedy can be found that will be universally successful in obtunding sensitive dentine. Take oil of peppermint, for instance. I applied it to the teeth in a certain case and secured complete relief in what were exceedingly sensitive cavities before its application; but this agent proved absolutely useless when used on other teeth in the same mouth. All these drugs may be useful in certain cases, and we should employ them as we find appropriate cases.

Dr. Ingersoll. Demineralized dentine may be very sensitive, and the healthy tissue below it may be found almost painless in excavating. It is a very common opinion that the pulp of a tooth is always very painful to the touch. This is an error. Its sensitiveness depends upon inflammatory conditions. In health it is not sensitive. To illustrate, a boy came to my office immediately after breaking off a tooth, its pulp being largely exposed. It was of the same color as the surrounding dentine, and touching it would cause no pain. The following day it had become red with inflammation and very painful to the touch.

Dr. Gardiner. I have used cocaïne three times in the extraction of pulps with good results. But I find that pain in excavating is much better lessened by the employment of good, sharp instruments.

Dr. Noyes. Calcium sulphide, according to Ringer, is used in

one-tenth grain doses to limit, abort, or control the formation of pus. In controlling pustules, one such dose is adminstered at intervals of one or two hours.

A CASE IN PRACTICE.

BY DR. T. W. PRICHETT OF WHITEHALL, ILL.

A study of the principles and appliances used in the correction of irregular teeth, as reported during the last few years, in the dental journals and transactions of dental societies, evolves but one principle or method by which such operations are performed, viz.: push and keep pushing, or pull and continue pulling, until the tooth or teeth shall arrive at the place intended. When a tooth is very much displaced and the intervening bone has considerable thickness, the "push" or "pull" method is usually both tedious and painful.

That auxiliary means may sometimes be taken advantage of to shorten the time and diminish the physical suffering of the patient, by pushing or pulling alone, the writer will endeavor to illustrate by describing a case occurring in his own practice.

About the middle of the month of January, 1884, a Miss V., aged eighteen years, called to have me undertake the correction of an irregular superior cuspid. The tooth had erupted inside the circle formed by the other teeth, and stood almost immediately behind the central incisor, and about twice its own diameter from the proper position in the arch. The deciduous cuspid and lateral incisor had remained in position until about two months before the date mentioned, when they were extracted, their roots being partially absorbed. A vulcanite plate and jackscrew were adjusted, so as to give a firm and positive force against the tooth. The screw was turned once and frequently twice, daily, for four weeks, with no effect whatever upon the cuspid. On the contrary, every tooth against which the plate had a bearing, viz., two bicuspids and three molars, became loose and sore, and were moving outward at a rapid rate. Believing failure would be the inevitable result if this course was persisted in longer, I began considering other means to effect the purpose, and studied more closely the conditions surrounding the tooth, to determine the cause of the extraordinary resistance.

The two sockets of the deciduous teeth and that of the cuspid itself formed a triangle, with a very considerable amount of unyield-

ing bone between. The sockets of the former being smaller and shallower than that of the cuspid, and the septum between the two lying exactly in the line of movement, seemed an all-sufficient cause to account for the resistance met. With this view of the case, what could be more simple than to cut away some of the intervening bone, and thereby weaken the resistance in front of the tooth. Not finding a precedent for such treatment in any of my books or periodicals, and remembering a statement made by a distinguished member of this society at its last meeting to the effect that such an operation would in no case be admissible, I had, therefore, a great deal of hesitancy in bringing myself to the point of putting the suggestion into execution.

The following operation was finally decided on and performed: With a fissure-bur, the septum between the temporary sockets was divided its entire depth. Thin sections of bone were then removed, extending through the inner alveolar plate, from the sockets of the extracted deciduous teeth to the proximal surfaces of the cuspid to the same depth as the cross-section through the septum, thereby nearly isolating the tooth from all bone-connection in front. A good attachment of bone was left across the entire labial front of the cuspid, so that when the tooth should be moved into position the abraded surface of this bone and that of the outer wall of the alveolus should come in contact, and be subject to the same conditions of repair as in cases of fracture of bone elsewhere.

The plate and jackscrew were applied as before, and in four days' time the tooth was in position, requiring but little force, and causing very slight discomfort to the patient. A retaining-bar and bands were adjusted to support the tooth steadily in position, and in two months' time the tooth and surrounding tissues had every appearance of normality, and continued so up to the time of my last observation, ten months later.

REPORT OF COMMITTEE ON DENTAL SCIENCE AND LITERATURE.

BY DR. C. R. E. KOCH OF CHICAGO, CHAIRMAN.

Owing to the fact that your Committee on Science and Literature was authorized and created quite late in last year's session, and that consequently no plan for systematic work could at that time be

discussed or arranged by the members composing the committee, and the further fact that the chairman has utterly neglected his duty of consulting with the other members until a very recent day, and has only heard from them in reply within a week, in which each of them expressed want of knowledge of his appointment, and on account of want of time for preparation asked to be relieved from responsibility, this report can only be such in a very imperfect and incomplete sense and through your sufferance.

The committee are, however, unanimous in the request that the annual vacancy of one member be filled at the earliest practicable moment of the present session, in order that they may be enabled, while together at this place, to mature a definite plan for the coming year, so that the next annual report may be more fully in consonance with the expectations of the society.

The chairman has made a somewhat extended examination of journalistic literature, and with your permission will submit the following observations in lieu of a report:

It will no doubt be very much of a gratification to you to learn that the field of dental journalism was extended, January 1st, by the birth of a new journal in Russia. It is published under the poetical title of *Zoubrooratchebnij Vestnik*, or in plain English *Dental Review*, and edited by Dr. M. Maksimoff.

A new quarterly, under the brief but comprehensive title of *Facts*, has also been born to dental journalism, at Chattanooga, Tenn. E. M. Martin, D.D.S., M.D., is its editor. Dr. Martin, it is observed, in the affix to his name has the D.D.S. precede the M.D. The salutatory devotes *Facts* "to professional education, and an especial endeavor to create a public opinion outside of the profession that shall require of dentists a thorough education and preparation for practice." We say Amen to this. But seeing that the inside back cover is taken up with an advertisement which gives great prominence to "Martin's Amalgam," unfortunately creates the suspicion that this quarterly is only another one of the many dental catalogues or price-lists sent forth under the guise of a journal.

We should have to regret the demise of the *New England Journal of Dentistry*, which has ceased to exist as such since our last meeting, were it not for the fact that all its rich scientific and intellectual assets have been transferred to the *Archives of Dentistry*, the successor of our old friend, the *Missouri Dental Journal*. Judging from the brief record of the *Archives*, we believe that it will prove a worthy heir of two valuable estates.

In looking over the files of the dental journals, one cannot help remarking the amount of labor performed in the development of our science and art the world over. Our periodicals now compare very favorably with those in the realms of letters or other sciences. In the countries where dental societies have been most active, as in Germany, England, and the United States, this is most conspicuous. It seems almost warrantable to conclude that, were it not for the stimulus of societies, there would be but little new thought in our journals. That is to say, eliminate from the dental journals of these three countries, among the articles published as original, all such as were first read before some society (and perhaps published in its Transactions), and the remainder will be very small. The *Dental Cosmos*, probably the most generally known and widest circulated in the world, measured from this stand-point, gave us less than sixty pages of original matter during the past twelve months.

Among new matters of interest in the journals has been the use of cocaïne in its various forms, which has excited universal consideration everywhere. Like all other new remedies, it finds many enthusiasts to laud it to the skies, but probably when the excitement of novelty has worn off and the drug becomes more generally known and cheaper, they will claim less for it. It is a very valuable, but not infallible, addition to our operating-room, but very much overrated by many writers.

Dr. W. Herbst of Bremen, Germany, has received a great deal of attention, especially in the German and English journals, on account of his method of employing rotary engine burnishers in the introduction of his filling materials,—that is, gold, amalgam, and tin and gold. As Dr. Reid is to give us a clinical demonstration of this method here, we will all have an opportunity of judging of the possible merits or demerits of the same.

While speaking of this new German method, I am reminded of a monograph reprint of an article published November 5, 1884, in the Kölnische *Zeitung* (Cologne *Times*), entitled "The Practice of Dentistry in the German Empire." It gives a very interesting and I believe entirely new view, to many, as to the *status* of our profession there. If the grievances alleged against our colleges in it have any foundation in fact, they retard our brethren in fatherland from the progress which they appear equally zealous for with ourselves, and it would certainly appear proper to give the complaint broad publicity.

It appears that in 1869 a law was enacted in Germany guarantee-

ing perfect liberty of avocation (Gewerbe-freiheit), since which time the healing art in any of its branches can be practiced by any one who sees fit, and without a diploma. The law does not permit the use of the title of doctor (arzt, wundarzt, zahnarzt), however, unless by the holder of a governmental or other diploma, and those holding the title under foreign diplomas must add to the title "approved abroad." This regulation it is claimed is more hurtful to dentistry than general medicine, because the people are less competent to discriminate among practitioners of the former than the latter. Many dentists circumvent the law forbidding the use of the title of tooth-doctor (zahnarzt) without a diploma, by calling themselves tooth-artists, tooth-operators, tooth-technologists, etc. Many use the title and practice under foreign diplomas. Foreign colleges, conspicuously our own, are said to be doing a great deal of mischief in accepting all aliens, and especially Germans, without regard to their qualifications, so long as they pay the fees; and by granting diplomas of doctor of dental surgery, after an attendance of four or five months upon lectures, demonstrations, and instructions, rendered in a language which most of such students do not understand, and after an examination unworthy of the name, conducted through an interpreter. Most of the German students, the article says, at the American colleges are such as could not, by reason of their utter want of previous training, be admitted to a course of professional study in Germany. Diplomas so obtained, and from institutions neither endowed nor controlled by the State, are of value only to the grantors as a source of revenue. It is said to be a notorious fact that the majority of German dentists who practice there under American diplomas scarcely understand a word of English. A number of gentlemen claiming American titles, who have never crossed the ocean, have been recently brought to grief by the courts, and the degrees granted *in absentia* by such "swindling associations as the Philadelphia University, Livingston University, and Wisconsin Dental College" have been pronounced worthless.

The article contains a very flattering acknowledgment to American dentists who have settled in Germany, to the great merit of Americans in the development of dental science, and to the influence exerted by the American school during the past two decades, not only in Germany, but everywhere. In this very fact lies the source of mischief, so it is claimed, as any one claiming an American diploma is enabled to obtain the full confidence of the German public without regard to his qualifications. The writer commends German

practitioners for coming over here, and enriching and broadening their information and experience in a post-graduate course.

The Prussian and Saxon governments, anxious to remedy the evils, so far as this can be done without legislative enactments, have already established chairs on dentistry in the Universities of Berlin and Leipzig, properly equipped with all appurtenances for thorough instruction, and the South-German States are urged to follow this example, and thus prevent "dentistry from falling into the hands of ignorant, empirics and thus to place in doubt any further scientific advance."

The April number of the *Odontographic Journal* is almost entirely occupied with a detailed account of the doings of the Odontological Society of New York on the occasion of its recent annual dinner. It is perhaps true that the connection between science and dinners is very remote, and that post-prandial speeches are not as a rule instructive essays, yet, remembering that *in vino veritas*, and that we profess to be searchers after truth, I feel warranted in making a few extracts from the speeches of two prominent gentlemen, as they stand in glaring contrast to a picture drawn by another pen, to which I desire to call your attention later.

Said Dr. J. Smith Dodge: "Dentistry is a part of the general science of medicine in every respect, historically, physiologically, pathologically, and practically. The profession of dentistry, no more nor less than other professions, is to be measured by its best men. A profession is learned when it is under the influence and guidance of men who can think, who can investigate, who can draw just conclusions, and mark out new and increasingly better ways. One man can do this for scores to follow."

Dr. D. B. St. John Roosa said: "It will be your fault if the natural relation which exists between dentistry and medicine or surgery is not fostered until it is made complete. You must use your aggressive powers until the medical profession brings you fully into the fold. There is where you have been placed by the most enlightened members of our profession, and there is where you belong. No man, no set of men, gets a position higher than that in which they are except by their own vigor and determination. It depends upon your own ability to make yourselves heard and make yourselves felt, whether you will be received by the medical profession, as you now are in this city and in all great cities in this country and throughout the world, as individuals. Dentistry needs no encomiums from my lips. The scientific research which has finally

culminated in the most accurate care of that part of the body has brought dentistry to its present position."

In contrast to these utterances, we find in the *Medical Record* of February 28 a two-column editorial entitled "Is Dentistry a Distinct Profession?" This the article says is a subject of interest to the medical profession, "*as efforts are being made*" to improve the means for dental instruction. Verily, efforts are being made! Where can our medical editor have been for twenty-five or thirty years, if he is only now discovering that "efforts are being made." Says he: "The work of the earlier dentists was confined mostly to tooth-drawing," etc., and "their ranks were recruited from among skilled artisans, notably goldsmiths, sources from which many continue to come." It is needless to say how much of truth and how much intended contempt and contemptuous falsehood is contained in this sentence; but assuming that it is entirely compatible with the facts, we might inquire: What was the work of the earlier physicians and surgeons, and whence were their ranks recruited formerly, and whence are they to-day? The origin and descent, studied genealogically, will be found to be of closely-related stock, and the intermarryings from without were not and are not now more plebeian in our profession and more patrician in general medicine. One would infer that the recruits for the practice of general medicine arrived in this world duly emblazoned with a nebulous M.D. in monogram, but the plain and undeniable truth will always be that

By communion of our efforts,
Beneficent and studious strivings;
By the baptism of our labors,
Children of one Church are we.

Creed and faction may devide us,
Race nor language can divide us;
Still, whatever fate betide us,
Children of one cause are we.*

But the article continues: "For the past quarter of a century dentists have been organizing themselves into associations, and some twenty 'dental colleges' have come into existence. From the brotherhood of these associations soon came into existence the so-called 'dental profession.' In the meantime there has been now and then an accession to their ranks of men possessing more or less knowledge of diseases of the mouth, who have attempted to raise the

* An adaptation from Miles O'Riley.

business of dentistry to the dignity of oral surgery." This colossal perversion of historic truth seems inexcusable, as all the older practitioners of dentistry know that our growth, scientifically and professionally, and our aspirations for better things, came almost exclusively from the men so contemptuously referred to, and medically educated persons only in rare and honorably exceptional cases fostered this effort. Further on the article says: "Just here we will venture to offer a word of counsel to those whose inclinations lead them to the practice of oral surgery, some of whom seem anxious to elevate the standard of all dentists to their own. It is this,—the attempt to educate persons at the outset as dentists is commencing the work at the wrong place." This position has been often and warmly discussed in this and other dental societies, without reaching any fixed result, excepting, perhaps, the conviction that, had dentists waited for the medical profession or medical colleges to take up the matter of fitting practitioners of dentistry as medical specialists, dentistry would not to-day stand scientifically or practically where it does. Had the medical colleges had the circumspection, energy, and ability to cover this matter of special training twenty-five years ago, it would not now have to complain of the "some twenty dental colleges." The fact is, our young profession, or specialty, or business, or however you see fit to designate it, saw the necessity for greater knowledge, and it had the energy to go to work to supply it. The blindness of medical men, begotten of their conceit, prevented them from improving their opportunity, or otherwise the matter of our education would have been precisely as those of the ophthalmologist and other specialists. To-day, if every dental college were to close its doors, the medical colleges would have to use the text-books and literature of our "business of dentistry." Yes, and they would even have to engage the teachers from these dental colleges, if they would be competent to teach. They could easily make these teachers fit to associate with medical men by conferring the degree of M.D., but they cannot by so doing add one jot of knowledge, or ability, or energy, or devotion to such teachers, for the man will be the "man for a' that." The editor evidently intends to show that dentistry is not a profession by itself, and that it is not now a specialty of medicine, but will be a medical specialty when dentists will forsake dental colleges and buy their diplomas at medical colleges. He closes by discouraging all specialism in medicine, inclusive of oral surgery, on account of the "consequent overdoing of local treatment." We all appreciate the extent of the force and

justice of this remark, and yet there are but few dentists of any observation and years of practice who do not recall numerous cases of *overdoing of general treatment.* Carelessness or ignorance should be eliminated in either case. He finally sounds the tocsin of alarm with this sentence: "Should the various specialists finally resort to this kind of trades-union protection" (referring to legislative enactments), "there will soon be no further use for the general practitioner." Evidently he has no faith in the doctrine of the survival of the fittest. But suppose this sad calamity should befall the general practitioner; there can be no doubt that every intelligent one will quickly drop into some special field congenial to him, and, if he can not find one, it may be worse for him, but better for the people.

In the number for March 21 of the same journal, under the editorial caption of "Dental Malpractice," is cited a case reported by Dr. Osman in the *Dental Cosmos*, of a lady "who had a wisdom tooth *'treated'* and filled," which seven months afterwards was discovered to have an "extensive alveolar abscess developed at the root." This was followed by "great rigidity of the jaw, necrosis, absorption of pus, and pyemia." The woman had previously been in excellent health. The editor comments in this wise: "It would be well for dentists to remember that the treatment of diseased condition requires a medical education." He does not say that it requires medical knowledge, or admit the possibility that a dentist could have this. We infer that men with medical education make no mistake, and that the tooth in question would not have acted as it did had a medically educated individual treated and filled it; and yet there is no word to show that the offending practitioner was not a medically educated man. It is an unfortunate fact that when we treat diseased conditions in our realm, and err in judgment, our failures are liable to come back to us or to some other practitioner to accuse us. Not so when the general practitioner errs; his mistakes are liable to be removed by the undertaker.

In the number for January 3d of the *Medical Record* is a three-column editorial on the "Causes and Prevention of Dental Caries," taken from Dr. Henry Sewill's article in the *London Lancet.* To see knowledge on this subject disseminated by a medical journal is an encouraging sign of the times; but it seems astonishing that matters so perfectly familiar to every dentist should be deemed sufficiently new to make them the subject of a long editorial in a medical journal that professes so much contempt for our calling.

At the meeting of the American Medical Association just concluded at New Orleans the following resolution was adopted:

WHEREAS, there is *no stimulus* for original research at present in the Association;

Resolved, That a first and second honor prize be offered for the best and second best paper, in each section, etc.

Reference to this is only made for the purpose of showing to our pessimistic friends who can see no promise of advance for us, except it come through the labors of the medical profession, that things are not altogether lovely there. May the day be far off when a dental convention will have to declare by resolution that it is in such an anemic condition as to require artificial stimulation to work.

At this same session of this learned and influential body there was some very generous "kicking" over the action of its committee on the International Congress which is to be held in Washington in 1887. So vigorous was this that at one time it was actually contemplated to annul all the work accomplished by the committee in its organization of sections. A compromise was finally reached by the addition to the committee of one member from each State and Territory, the army, the navy, the marine hospital service, and the District of Columbia, and this enlarged committee was instructed to review, alter, and amend the action of the present committee. So far as we are concerned as dentists, we might have a special interest in this congress, by reason of the Section on Oral and Dental Surgery, which has been established, and for which the officers have been chosen by the general committee; which action, however, now becomes a matter for the consideration of this new committee. So far as the officers chosen for this section are concerned, there can be no fault found, excepting perhaps in the manner of their selection. If they are to reflect the best thought of our profession or specialty, and we are to be held responsible for what they do, it would have seemed more considerate to have consulted us or our societies more. But if this section is created strictly as a specialty of general practice, it is perhaps consistent enough with the attitude of the general profession of medicine towards dentistry generally that it should say who shall officer and who shall compose the section, without consultation of the dental profession. It is understood that membership to the section will be confined to such dentists as shall receive invitations to attend from the council of the section, and that the dental profession, in society assembled, will not be allowed the privilege of saying who shall represent it. All this I conceive is entirely proper, except that under such circumstances our profession must disclaim all responsibility or credit in the affair.

With an apology for the license I have exercised in submitting this substitute for a committee's report, and my thanks for not having had a point of order raised, and your kindness in patiently listening, I submit the whole with a renewed assurance of earnest devotion to our beneficent profession.

Discussion.

Dr. Ottofy spoke of the advancement of dental science in Europe, noting the recent establishment of dental periodicals in Austria, Sweden, and Spain as favorable signs.

Dr. Koch said that at one of the meetings of a German dental society a member stated that his coachman of a few months ago, who had been with him for some years, had gone to America and come back and opened a dental office, having been graduated as a D.D.S. by an American dental college; that, upon the statement that he had been the doctor's assistant for over five years, the faculty had given him credit for one course of study. The applicant was not required to produce any evidence of pupilage, and the faculty did not inquire into the nature of the assistance rendered by the matriculant to his alleged preceptor.

Dr. Crouse. I have taken the ground that to properly educate a dentist he must be taught dentistry as a distinct profession. It cannot be done in medical colleges, because they are more interested in the money the student brings in than the knowledge he takes out. The more medical knowledge the dentist obtains, the better fitted he is to serve his patients; but he must place the greatest dependence on dental colleges for advancement.

Dr. Newkirk. I wish to compliment Dr. Koch's report. It was interesting and spicy, and I hope I may never listen to a worse one. In regard to articles in the *Medical Record* concerning the denta profession, it might be well for the medical man to be better informed of the work that is being done in dental societies.

Dr. Cushing stated that the National Association of Dental Faculties had agreed to graduate no one who had attended less than two full college courses. This agreement of the college faculties was the result of the action of the National Association of Dental Examiners, and the State of Illinois may justly take to herself some credit for its share in the work.

Dr. Ottofy. I would inquire of Dr. Cushing if the Delavan College (Wis.) has entered into this agreement.

Dr. Cushing. *That* institution is *not* a recognized college.

Dr. Ottofy. Can you tell me what the alleged Delavan College has done? Rumor says that it is about to disband.

Dr. Cushing. I do not think that the Delavan people have taken any such steps; but bogus colleges in Pennsylvania and elsewhere have been disbanded.

Dr. Taylor suggested that it might be wise for some of our German scholars to send occasional contributions to the German periodicals on the subject of dental education.

Dr. Black inquired: To what extent are American journals read in Europe by European dentists?

Dr. Ottofy. Very little, I think.

Dr. Black. I asked in order to judge whether, if Dr. Taylor's suggestion was carried out, it would be noticed and of use there.

Dr. Koch. I should differ from Dr. Ottofy in regard to the amount of interest taken by the German dental journals in matters pertaining to dentistry in this country. There is scarcely a number of the *Monatsschrift* that does not contain some extracts or reprints from our journals, and I find that matters considered in this journal are generally abreast with the current of thought in our own literature.

Dr. Ottofy. I have been reading six foreign dental periodicals for about three years past, and in so far as their notices of our American literature is concerned I would prefer almost any one of our own journals to all of them.

Dr. Sturgiss. In regard to the desirability of a medical education to the dental practitioner, I feel that I should be very thankful to possess that which the degree of doctor of medicine implies, even without the honor of the title.

Dr. Brophy. This subject of dental education has been much discussed in years past, but comes up at each meeting as fresh and interesting as ever. During the past three years my opinions on this subject have materially changed. I now firmly believe that if a man aims to become a dentist he should first gain a knowledge of the principles and practice of dentistry before studying medicine. I would not have said this a few years ago, but the experience gained in our college has changed my opinions on this subject.

The physician thinks the maximum knowledge he needs to practice dentistry is acquired in medical colleges, but experience in practice proves the contrary. The dentist cannot succeed without the practical knowledge gained from clinical experience. I think the relations between the dentist and physician are most harmonious, and my experience with medical students confirms me in the belief

that they are anxious to gain more knowledge in regard to dental diseases.

Dr. Noyes. I am glad to hear Dr. Brophy say what he did just now about dental education. The change of his views in the two or three years past is the result of experience and observation, and consequently is likely to be permanent.

The complaints in regard to the treatment accorded dentists by physicians is mostly directed against the medical journals. The professional intercourse between individuals of the two professions is usually pleasant enough, depending, as in all such cases, upon the professional and personal character of the men in each instance.

The problem of dental education is one we shall always have before us so long as there are young men to be educated and the methods of doing it are anything less than perfect. The medical sciences, anatomy, physiology, pathology, chemistry, etc., are the only suitable foundations for both dental and medical education, and the courses of study in all of them should be alike in both schools. If it is convenient to do so, there are manifest advantages in having dental and medical students in the same classes for all these studies, as well as for dissecting and the work of the physiological laboratory. To these subjects, which are equally important to both, the medical and dental schools should add such other instruction and such clinical and experimental teaching as may best fit their students for the work they expect to do. The most difficult objection to overcome in the way of giving dental students a full medical education is the limitation of time and means, and the impatience of students to get into practice. It is not feasible at present to *require* more than a three years' course, and every moment of that time is needed to fit ordinary students to practice decently in *either* medicine or dentistry. Of course they cannot fit themselves for both without more time. I believe it fair to say that dental colleges furnish as complete and suitable a training for dental practice as the medical schools do for ordinary medical practice.

REPORT OF THE COMMITTEE ON DENTAL ART AND MECHANISM.

BY DR. JAS. A. SWASEY OF CHICAGO.

Mr. President and Members of the Illinois State Dental Society:

Your Committee are able to report the following new appliances, viz.:

A sand-paper disk with plain center and sanded margin, the invention of J. W. Smith, D.M.D.

Dr. E. D. Swain presented a disk mandrel.

Dr. T. W. Brophy presented a plugger for direct mallet force, the invention of Dr. Perry.

Dr. W. T. Magill presented a mouth-mirror, the glass of which is protected against scratches from the corundum-wheel. It can also be arranged to catch filings.

Separators, Jarvis's pattern, improved by Perry.

Dr. W. W. Allport, a plugger, the mallet end of which is serrated to be used with a steel mallet, with its face also serrated, which is to prevent slipping in malleting.

Dr. E. B. Call. Aluminum cups for trimming roots which are to be crowned. Also, a spreading device for stretching a fitted metal band in crown-work, so that it will be bell-shaped, without changing the part fitted to the root.

Dr. E. S. Talbot. A rubber-dam stretcher to clamp the rubber back when using disks. Also, a set of scalers. Also, wire regulating springs for spreading the dental arch.

Dr. Rehwinkel. Hickory wedge-wood, which bends easily and is very adjustable.

A device for making and mounting corundum-disks was presented by Dr. Swasey.

Dr. A. W. Harlan. A pair of scalers, rights and lefts, with double curves, to be used with a push motion.

Respectfully submitted,

WM. H. TAGGART,
J. FRANK MARRINER,
JAS. A. SWASEY,
Com. on Dental Art and Mechanism.

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